A Database Publication

THE MICRO USER

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Number 4
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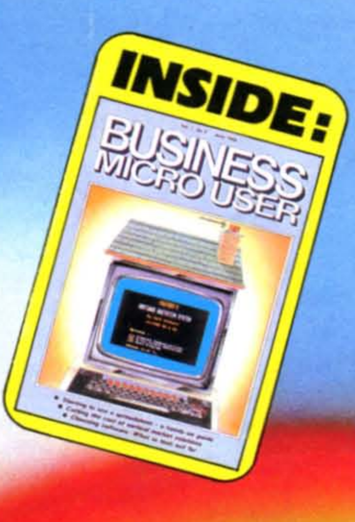
INSIDE:

BUSINESS MICRO USER

Top-selling guide to the BBC Micro!

Bring your lightpen to life!

2 great games: Play Spacebase and Pendragon

Eprom blowers: Detailed survey

REVIEWS: Aries B32 • Mega ROM • Icon Master • U2 • System Delta

CUB'S COLOURFUL MASTER PIECE

Acorn's BBC Master Series bring exciting new levels of sophistication to a proven family of micro computers. Unfortunately, not all monitors on the market can do justice to the Master Series' colour display capabilities.

That's why more BBC users choose a Microvitec CUB colour monitor than any other – because every model in the CUB family is a masterpiece of high performance British design. The clarity, depth of colour and rock steady image seen on a CUB display allows the user to exploit graphics and text to the full – just ask for a demonstration of a CUB alongside someone else's monitor and you'll be totally convinced.

In the meantime, the picture above amply demonstrates why a CUB is a delight to the eye in more ways than one.

Model	Resolution	Screen	Bandwidth	Application
1431/DS4	Standard 452(H) x 550(V)	–	18 MHz	Education, Home, Colour graphics use
1451/DS4	Medium 653(H) x 550(V)	Anti-glare	18 MHz	80 column, text-processing. High quality graphics.
1441/DS4	High 895(H) x 550(V)	Anti-glare	18 MHz	High-resolution graphics and text applications.

Available with tilt and swivel option. Also available are Microvitec's range of popular BBC-compatible metal cabinet monitors 1431/MS4, 1451/MS4, 1441/MS4.

TOUCH SCREEN OPERATION

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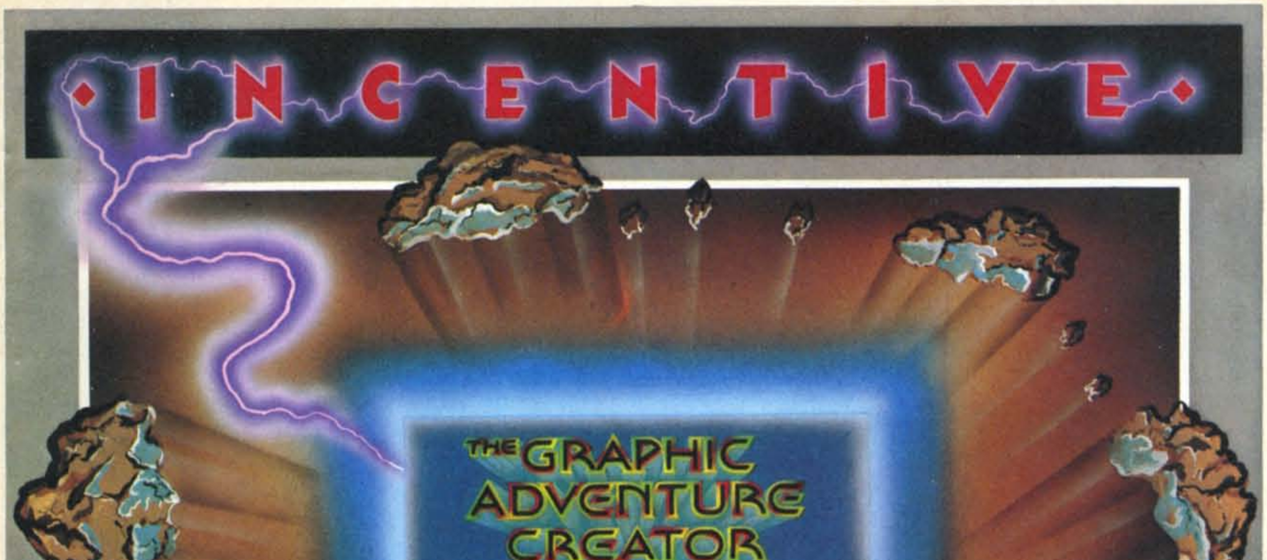
Available from High Street Computer Retailers and branches of W. H. Smith, Boots, John Lewis Partnership, Laskys and Currys.



THE GRAPHIC ADVENTURE CREATOR

The amazing, combined text and graphics adventure generator enables you to produce fast, compact adventure games with the minimum of effort and the maximum of creativity. Stunning graphics can be created quickly and easily with the powerful picture generator that has many features including:– dot, circle, elastic line, ellipse, fast fill, shading, step by step review, easy editing and the ability to merge pictures.

The comprehensive, intelligent command interpreter can handle complex sentences and multiple input commands. There is also an extensive text compression facility that allows you to produce far more detailed and numerous location descriptions. Plus a full function editor, automatic word formatting, a logical command interpreter and an abbreviated input acceptance facility.

So unleash the power of your imagination now with **The Graphic Adventure Creator,** for your BBC B computer. Available from all leading retailers or direct from Incentive on 0734 591678.

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ABC 64,956
January-June 1985

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Compete against your BBC Micro – for just £4!

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There are six thrilling sports events in Winter Olympics – the latest exclusive offer for readers of *The Micro User.*

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HOTLINE
a personal guide to computer communications
THE NEW HACKER'S HANDBOOK

communications . . . with Hotline and the NEW Hacker's Handbook – two fascinating books about the fastest growing field in micro-computing.

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BUSINESS MICRO USER

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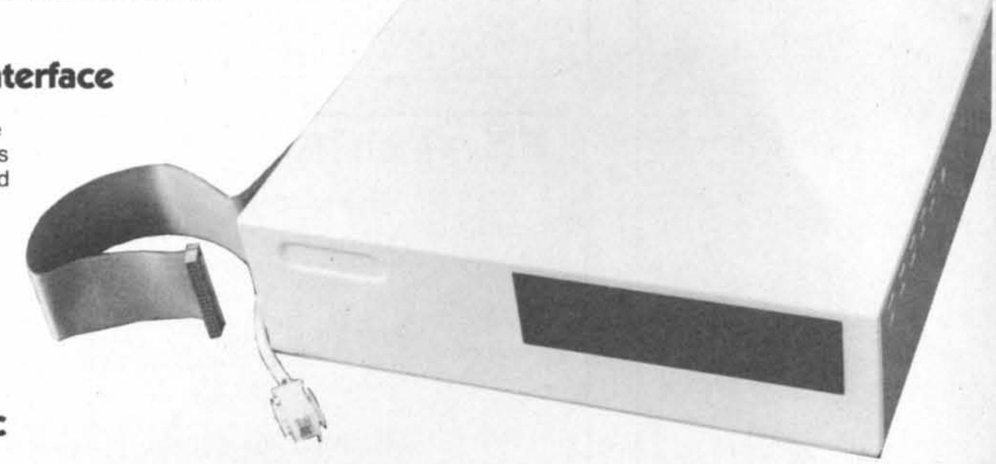
A rare breed

DO YOU know the ins and outs of the BBC Micro?
CAN YOU program fluently in Basic and machine code?
ARE YOU able to pass on your knowledge clearly and concisely?
HAVE YOU had experience of writing, and are you interested in a career in computing magazines?

If the answer to all the questions is yes then you could be the person we're looking for. Write, giving a full CV and examples of your work to: Personnel Manager, Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Disc Interfaces and Wi

Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.



The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

The Solidisk 1770+8271 Disc Interface

If you already have a 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at a flick of a switch. The 1770+8271 Interface is supplied with the Solidisk DFS+ADFS ROM set. This is available in two 16K or one 32K ROM.

Features built into ROM	**DFS 2.2**	**ADFS**
Disc formatter	yes	yes
Disc verifier	yes	yes
Memory editor	yes	yes
Disc sector editor	yes	yes
Disc copier	yes	yes
Recover & Restore	yes	yes
Read track & Write track	yes	yes
Run 8271 floppy disc controller	yes	no
Osword 7F emulator for 1770	yes	yes
Tape to disc	yes	yes
Download	yes	yes
DFS files to ADFS	no	yes
ADFS files to DFS	no	yes
40/80 switching for 80-track drives	yes	only in DFS
Solidisk Winchester	no	yes
6502, Z80 and 32016 compatible	yes	yes
Read & Write IBM-PC DOS discs	yes	yes

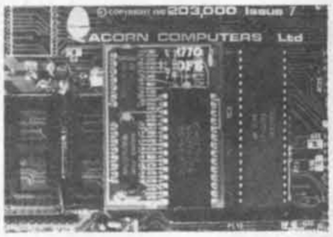
Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

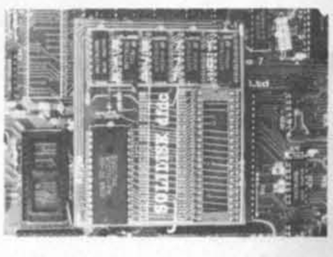
The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00





chesters from Solidisk

The Solidisk Winchesters are now available for the BBC Model B, B Plus and the new Master Series machines. They are supplied with the Solidisk DFS+ADFS ROM set, available in two 16K or one 32K ROM.

WINCHESTER FOR SINGLE USERS

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to the drive size in length. Up to 10 files can be open at the same time and unlimited numbers can be organised in a multi-level catalogue. Files can grow in place without risk of "Can't extend".

The ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M (Z80), Panos (32016) as well as 6502 ADFS. The Acorn Z80 Second Processor as supplied requires a new BIOS ROM to run CP/M.

WINCHESTERS FOR SMALL NETWORKS

Solidisk will soon introduce the NET-DISC Filing System (NDFS). This, although using the standard ECONET hardware, implements a direct link between any workstation and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed.

The NDFS will also be suitable to network 32016 and Z80 Second Processors. The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives.

WINCHESTERS FOR LEVEL 2 FILE SERVERS

The Solidisk Winchester Disc Filing System (WDFS) ROM enables the Acorn File Server (Level 2) to use the Winchester in place of floppy disc drives. This will improve both speed and capacity. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

HIGHER CAPACITY, RELIABILITY AND SPEED

The Winchester drives have much higher capacity than floppy discs, measured in Megabytes instead of Kilobytes. The disc is protected from dirt by a sealed casing, and has a much higher inherent reliability. The disc rotates continuously at high speed (3600rpm) enabling data to be transferred 20 times as fast as floppy discs.

HARDWARE REQUIREMENTS

To use a Solidisk Winchester, you will need a 1770 Disc Interface (Acorn or Solidisk). Master and BBC B Plus machines have this as standard. If your BBC B has no disc interface, we recommend the Solidisk 1770 Disc Interface. If you already have the 8271 Disc Interface, we recommend the Solidisk 8271+1770 Disc Interface. The Winchester drive is connected to the 1MHz bus socket.

5.25 inch WINCHESTERS

These drives (10, 20 and 40 Megabytes formatted) are of established design, with low noise and power consumption and have the same "form factor" as a half-height floppy drive.

3.5 inch WINCHESTERS

These are of the latest technology, with even lower noise and power consumption in a smaller package, and have the same "form factor" as a 3.5 inch floppy drive.

BEEB-POWERED OR MAINS-POWERED

The Beeb-powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply and all Master series. The Winchester power lead will also support a floppy disc drive. In other cases, a mains-powered Winchester should be specified.

THE SOLIDISK WINCHESTER RANGE

Each Winchester drive comes with:

— Integral power and data leads.
— DFS (or WDFS on request) and ADFS ROM set.
— One utility diskette in 5.25 inch, 80-track double-sided ADFS format.
— Manuals covering the above hardware and software.
— One year guarantee.

The Solidisk Winchesters are available in the following packages:

	BEEB-POWERED	MAINS-POWERED
10 Megabytes 5.25 inch	**£499.00**	**Not available**
20 Megabytes 3.5 inch	**£720.00**	**Not available**
20 Megabytes 5.25 inch	**£661.25**	**£747.50**
40 Megabytes 5.25 inch	**£1062.60**	**£1148.85**

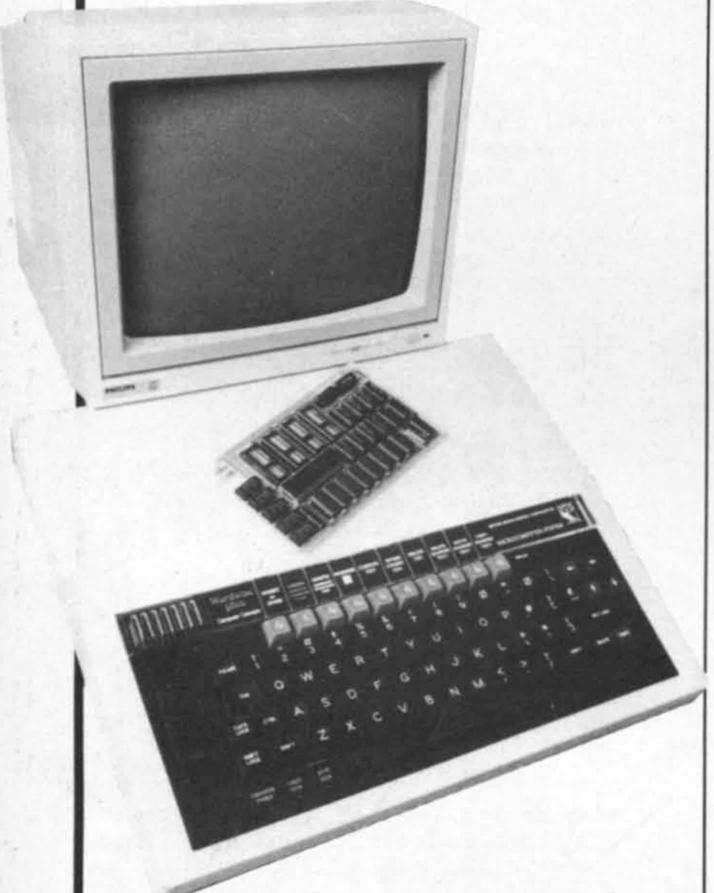
Delivery (in the UK) by courier £10.00. All prices include VAT at 15%.

SOLIDISK MEMORY UPGRADES

Solidisk memory upgrades for the BBC Model B offer excellent value for money. Their designs stand our for compatibility, speed, versatility and computing power. They use the latest component technology to achieve the lowest possible power consumption and size at low cost.

External ROM Cartridge

This comprises an adaptor which plugs into any ROM socket, and a blank cartridge which will accept one or two ROMs. These may be of 16K, 32K or 64K, depending on the capacity of the ROM socket holding the adaptor. This system is particularly useful for seldomly used ROMs, which are well protected by the cartridges. They can be installed and removed repeatedly without any risk to the ROMs and are compatible with Acorn cartridges.



Fourmeg CPU and ROM Expansion

The Fourmeg board plugs into the 6502 Processor socket, and two additional connections are made by sprung clips. It also provides one 64K and three 32K additional ROM sockets.

By adding faster memory and a 4MHz Processor, this board enables the BBC to run most programs in half the time. The new Processor is equivalent to that used on the Acorn TURBO board. It will run most Master software such as the new BASIC 4 and at twice the speed.
A switch selects between normal (2MHz) and fast (4MHz) speed. The higher speed is available to all ROMs and RAM installed in the Fourmeg board. The rest of the machine is unaffected.

Fourmeg Board with 32K RAM

This comprises a Fourmeg board with 32K RAM and a 16K MANAGER ROM. This extra RAM gives Shadow RAM and Sideways RAM capability. Shadow RAM supports the screen in any mode, leaving all the machine RAM free. Sideways RAM can contain the images of two Sideways ROMs or used as RAMDISK or printer buffer. Shadow and Sideways RAM, and the four additional ROM sockets can be switched to the fast 4MHz speed.

32K, 64K and 128K Sideways RAMS

These are the most popular add-ons for the BBC Model B. You can start with 32K and upgrade later to 64K, 128K (and even 256K). The 64K and 128K RAM boards have two 32K additional ROM sockets.

Solidisk Sideways RAM boards are compatible with most add-ons except ROM boards — which they replace. Sideways RAM can run almost all software that is normally available in ROM. Solidisk has a large library of application programs. These include Word-processor, Spelling Checker, Database, Spreadsheet, Extended Basic, Sprites, Ramdisc, Printed Buffer, Machine Code Monitor etc. and more than 70 computer games especially written for Sideways RAM. The programs are available in three packs, each of 5 discs, in 40 or 80-track formats. Pack 1 is included with all Sideways RAM board. Packs 2 and 3 cost £10.00 each (£1.00 p&p). Pack 3 consists entirely of games and game design tools.

The CPU and Keyboard Case

This compact steel case can hold a BBC and two 5.25 inch half-height floppy disc drives. The keyboard is housed in a separate case connected by a 24 inch lead. With the monitor on top, it improves your viewing angle and leaves your desk uncluttered.

The 256K Board

This has 256K of RAM, four ROM sockets, a 4MHz Processor, a 32K Manager ROM, together with WORDWISE PLUS — the best selling Wordprocessor from Computer Concepts.

The 256K RAM can be used as Shadow RAM, Sideways RAM and RAMDISK, or any combination of the three.

Real Time Clock and Solidesk

The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up — just like the new Master Machine. It also presents a friendly ICON/MOUSE environment — with calculator, memo and a number of disc operating system commands (DFS and ADFS). An AMX Mouse or a Marconi Tracker Ball is preferred as the input device, but the keyboard may also be used.

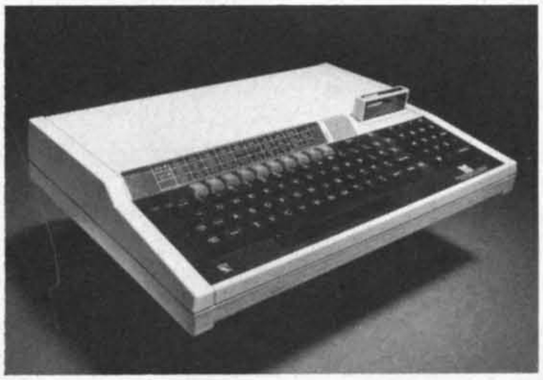
Floppy Disc Drives

Solidisk floppy disc drives are 80-track, double-sided, 5.25 inch, with a capacity of 640K in ADFS or Solidisk double density DFS. They are Beeb-powered, supplied cased, with power and data leads, and a software pack of 5 diskettes.

BBC Master in Stock, Special Package Offers Available

1) 128K BBC Master, with Wordprocessing package £750
2) Business Pack: complete 3 operating 128K Master keyboards, Econet, 160cps printer, 20MB Winchester, 1 floppy drive, Wordprocessor, database, spreadsheet, all leads and manuals. Call for demo. Ideal for small offices £2399.00

All prices include VAT, delivery extra.



Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as ★PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

Viewdata Host

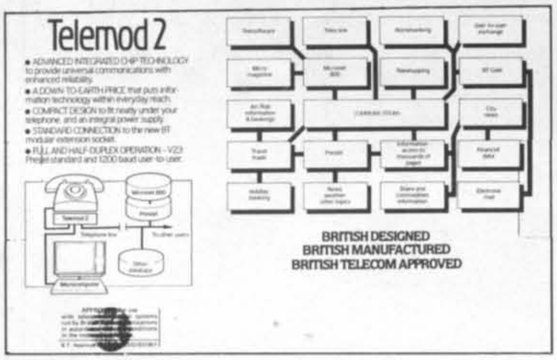
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.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Prestel
Telephone line
To other users
Microcomputer
BRITISH DESIGNED
BRITISH MANUFACTURED
BRITISH TELECOM APPROVED

Solidisk local experts

Soidisk has a nationwide network of more 90 local experts and a growing number of experts overseas. They do not usually sell our equipment but can generally fit it free of charge. Please ring Solidisk Sales office. If you wish to call at our office for a fitting however, it is necessary to make an appointment.

Telephone Southend (0702) 354674 (16 lines)

ORDER BY MAIL: Please complete the coupon opposite (or a copy) and send it to:

Prices, inclusive of VAT:

RAM/ROM expansion

Qty		Price	P&P
....	External ROM cartridge adaptor	15.00	1.00
....	Basic Fourmeg Board	30.00	1.00
....	Fourmeg Board with 32K RAM	69.00	1.00
....	Sideways RAM 32K with software pack 1	50.00	1.00
....	Sideways RAM 64K with software pack 1	80.00	1.00
....	Sideways RAM 128K with software pack 1	125.00	1.00
....	256K Board with WW+ and Manager ROM	175.00	1.00
....	Real Time Clock and SOLIDESK ROM	29.00	1.00

Disc Upgrade

Qty		Price	P&P
....	1770 Upgrade with 2.2 DFS ROM	45.00	1.00
....	1770 + 8271 Upgrade 2.1 DFS ROM	60.00	1.00
....	ADFS + DFS ROM set	20.00	1.00
....	Upgrade from DFS to ADFS + DFS	10.00	1.00
....	Solidisk 80 track double sided drive	109.00	3.00
....	Dual Drives, CPU and Keyboard case	230.00	6.00
....	CPU and Keyboard case alone	30.00	6.00
....	EFS for the Electron	59.00	1.00

Wordprocessor Package

Qty		Price	P&P
....	Wordprocessor for the B+ or Master	309.35	10.00
....	Wordprocessor with 1770 DFS & 2 drives	458.85	10.00

Winchesters

Qty		Price	P&P
....	10 MB 5¼in. Beeb powered	499.00	10.00
....	10 MB 5¼in. mains powered	569.00	10.00
....	20 Mb 5¼in. Beeb powered	661.25	10.00
....	20 Mb 5¼in. mains powered	747.50	10.00
....	20 Mb 3½in. Beeb powered	720.00	10.00
....	40 Mb 3½in. mains powered	1148.85	10.00

Modems

Qty		Price	P&P
....	Linemaster ROM and manual	10.00	1.00
....	Telemod 1 MODEM (BABT approved) with Linemaster ROM	50.00	3.00
....	Other MODEMS	P.O.A.	—

Datalife Diskettes

Qty		Price	P&P
....	MD525 (SS/DD) box of 10	16.00	1.00
....	MD557 (DS/QD) box of 10	25.00	1.00

EPROMS

Qty		Price	P&P
....	2764-25 25pcs. (to clear)	25.00	1.00
....	27128-25 (or better) pack of 5	25.00	1.00
....	27256-25 (or better) pack of 3	25.00	1.00
....	UVIPROM Eprom Programmer	19.00	1.00
....	UVIPROM32 for our 27256's	21.00	1.00
....	UVIPAC Eprom eraser	20.00	1.00
....	Solidisk Toolkit ROM	10.00	1.00

Total ....

Name: ....

Address: ....

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VISA

ACCESS

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Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

MICRO MEDIA Computer Supplies

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Potters Bar, Herts EN6 2BP

UNBRANDED 5¼" DISCS

Lifetime warranty – hub rings – envelopes – labels – write protect tabs.

PRICES PER BOX OF 10	TPI	Tracks	1 Box	2 Bxs	3 Bxs
SS/DD	48	40	7.70	7.50	7.30
DS/DD	48	40	9.60	9.30	9.00
DS/DD	96	80	12.50	12.30	12.00
3M LIFETIME GUARANTEE					
SS/DD	48	40	12.20	12.00	11.80
DS/DD	48	40	14.80	14.60	14.40
SS/DD	96	80	18.50	18.30	18.10
DS/DD	96	80	18.70	18.50	18.30
VERBATIM DATALIFE					
SS/DD	48	40	12.80	12.60	12.40
DS/DD	48	40	15.80	15.60	15.40
SS/DD	96	80	15.80	15.60	15.40
DS/DD	96	80	20.50	20.30	20.10
NASHUA LIFETIME GUARANTEE					
SS/DD	48	40	10.90	10.70	10.50
DS/DD	48	40	14.50	14.30	14.00
SS/DD	96	80	15.50	15.30	15.00
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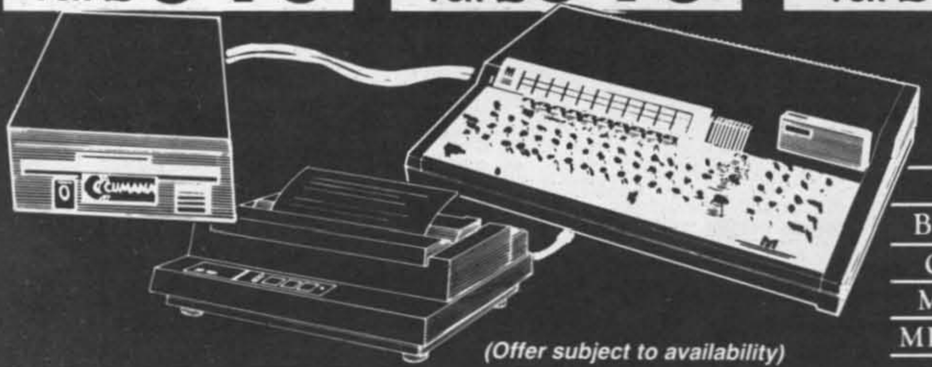

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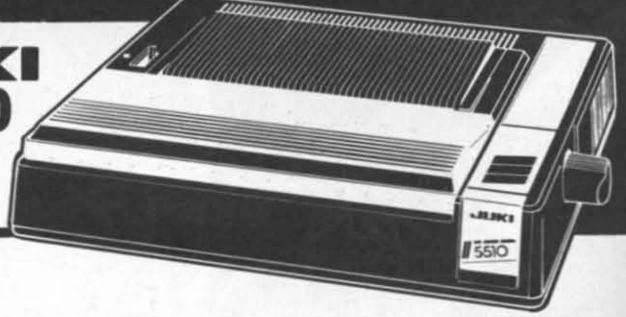

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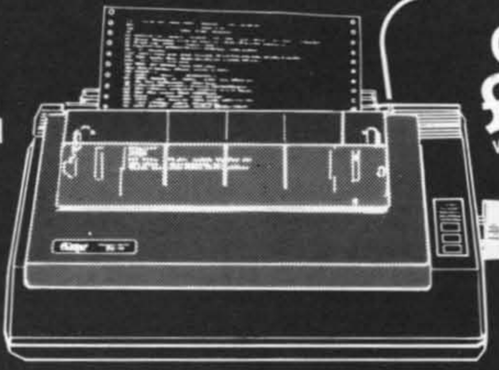

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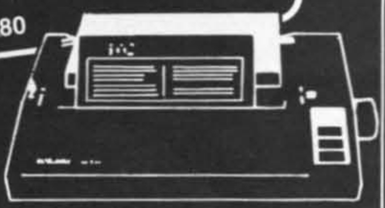

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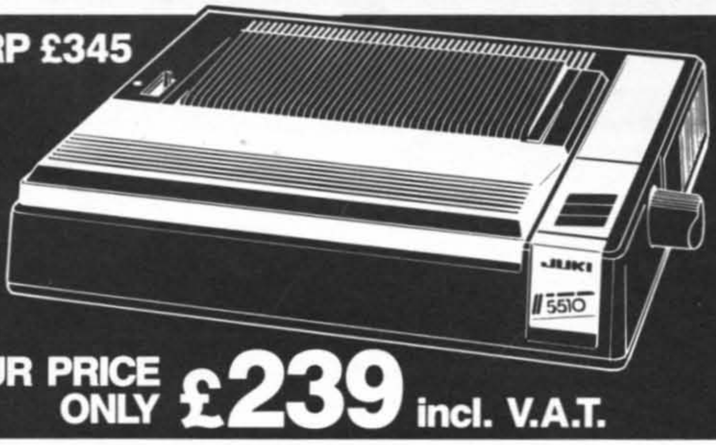

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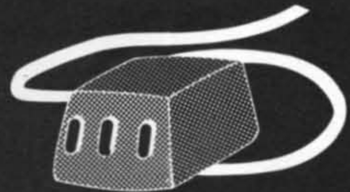

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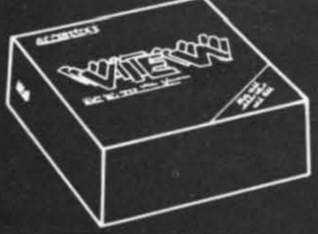

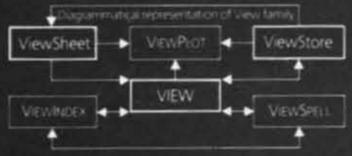

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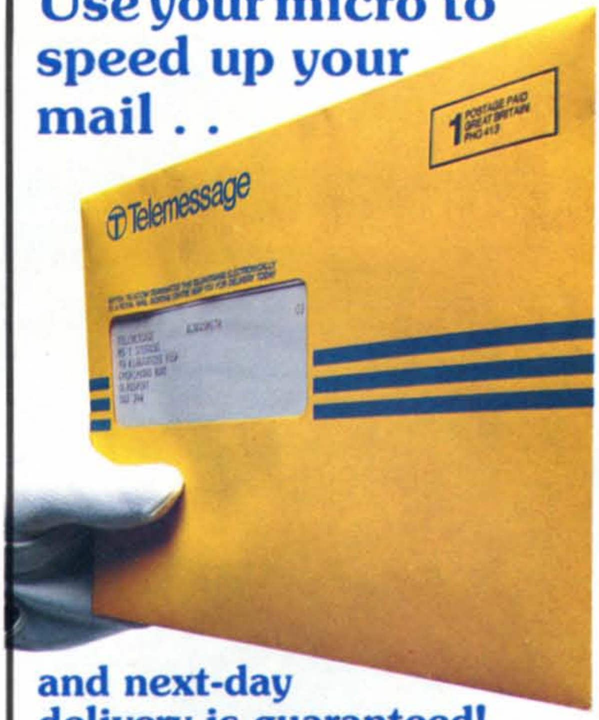

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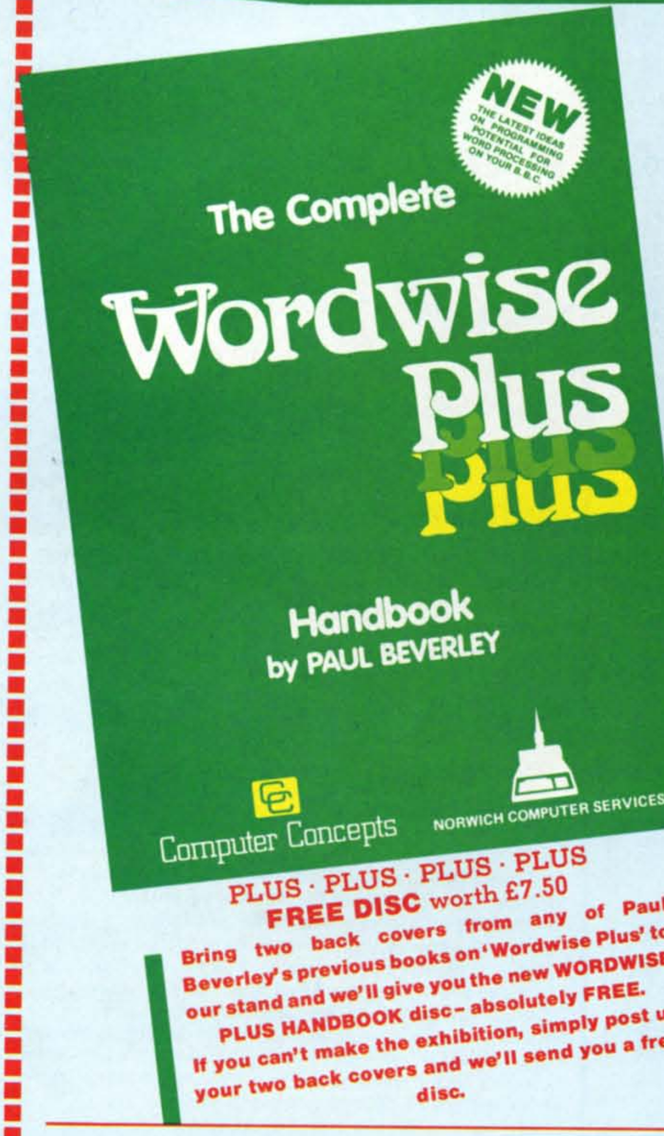
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Welsh schools to get the Master 128

A MAJOR deal involving the BBC Master series and Welsh schools is being seen as proof that Acorn has weathered its recent financial storms and is heading for prosperity again.

West Glamorgan County Council has spent £250,000 to provide its comprehensive schools with Master 128 micros and the Econet network, the first half of a planned £500,000 computer purchase programme for 1986.

Delighted executives at Acorn's Cambridge headquarters say the sale indicates that the company many thought was dying only a year ago is ready to boom again.

"The West Glamorgan purchase is one of the most significant deals in the entire history of Acorn", a company spokesman told *The Micro User*. "It proves we have a solid future ahead of us".

The county's 26 comprehensive schools already had BBC Micros, but the education authority believes the purchase of 432 Master 128s and interfaces for the Econet link-up was a necessity to keep pupils ahead in computer technology.

West Glamorgan's Deputy Director of Education, Graham Bingham, said: "We were planning to spend a capital sum on the schools when the new Master machines came on the market.

"We decided to go for the increased capacity in the Master 128 because we felt it important to make this substantial investment in the very latest technology.

"Within the next six months we will be spending a further £250,000 on new micros for our 170 primary schools".

The Master networks to be installed in West Glamorgan use a 30 Mbyte file server, enabling teachers to transfer any school subject on to the screen of classroom computers and check on individual pupils.

At the county's computer centre in Baglan, Port Talbot, 30 Master 128s will be installed to supplement the 22 BBC Micros already there.

This will enable more teachers to attend computer education courses and increase production of software tailored specifically for West Glamorgan schools.

Peter Craddock, adviser for computer education, says: "We shall be seconding teachers to the centre to evaluate existing software and to produce new work".

Modem is approved

THE Magic Modem for the BBC Micro has received BABT approval. Now DataStar Systems is looking for distributorships for the auto-dial, auto-answer £99.95 unit.

"It has taken five months and cost more than £10,000 but I'm delighted that it has finally been approved", said Barry Krite of DataStar.

ACORN HEADS INTO BLACK

ACORN'S latest financial statement shows that the company lost almost £3 million during the last six months of 1985. But despite the firm continuing to operate in the red, the news had executives smiling because the loss for the previous six months had been more than £22 million.

Acorn's bosses can now see daylight at the end of the tunnel for the company which was in deep financial distress 12 months ago. Managing director Brian Long is even talking about the possibility of operating at a profit again this year. "I shall be extremely surprised if we make a loss in 1986 and extremely pleased if there's a significant profit", he said recently.

"The latest figures are marginally better than we had dared hope for", an Acorn spokesman commented. And stockbrokers Hoare Govett described the statement as being in line with expectations, the reduced losses being consistent with the rationalisation of its operations undertaken by Acorn since Olivetti took control.

Long described the last six months of 1985 as "a transitional period in which the company defined a strategy for its future and took major steps to re-establish its operations on a sound basis.

"We attacked the problem of excess stocks and purchase commitments, reducing the former from £18 million at June 30 to £7.9 million at year end", he said. "Significant progress has also been made in streamlining corporate activities and reducing overheads".

Long says Acorn's activities are now centred on three areas – high technology research and development, exploitation of R & D along strictly defined specialist sectors, and new deals with original equipment manufacturers.

Master upgrades will cost less

TWO new upgrades in the BBC Master series will be cheaper than at first thought.

Originally it was envisaged that the Master 512 upgrade would be "near" £500 but now the firm figure will be £399.

The Master 512's extras over the 128 include an 80186, 16 bit chip with a clock frequency of 8MHz, 512k RAM and ROM capacity up to 256k.

It also features DOS+, a disc operating system giving compatibility with MSDOS 2.1 and CP/M 86.

The Master Scientific will cost £999 against the expected £1,500.

The Master Scientific matches the Master 128 and adds a National Semiconductor 32016 32 bit chip with 512k of RAM and 16k of ROM, containing the Tube communications code and Pandora operating system core. It also has an NS32081 floating point processor.

RACE IS ON FOR MODEM

A BATTLE of the modems is shaping up as manufacturers seek to take advantage of the built-in comms potential of the BBC Master.

The machine incorporates an internal connector for a communications device and two companies have already announced products to support it.

Determined to be first on the market is Modem House, with an £89.95 internal modem, including software.

Managing director Keith Rose says he will sell the product without BABT approval at first, but expects to get the green sticker "about September".

Meanwhile agreement has been reached between Pace Micro Technology and Acorn to produce the official internal modem for the Master. It is expected to cost about £150.

It will handle V21 and V23 in both answer and originate modes and provide auto dial/auto answer facilities.

Since the modem is an internal device, it will leave the serial port free for other purposes.

Show-stoppers line up

NEW products continued to pour on to the scene as the countdown began for the Electron & BBC Micro User Show at the Royal Horticultural Hall in London from May 16 to 18.

Organiser Database Exhibitions says the speed at which stands and advance tickets have been snapped up indicates the event is set to break all previous records.

Advanced Computer Products has just announced three newcomers, including a totally rewritten Acorn 1770 DFS for the Master series with enhanced existing features and added new ones.

Its ability to operate in double density means files can now be as large as 640k, occupying both sides of a disc, and automatic file relocation means the user no longer gets the "can't extend" message.

With the Advanced 1770 DFS's improved file handling any application which uses files, especially databases, can now run much faster. Its price is expected to be between £30 and £40.

Also from ACP is ADI, a powerful disc utility ROM for standard and non-standard discs, which runs on the BBC Micro and B Plus and will cost £28.75.

The third ACP product to be launched at the show is Advanced ROM Manager, a utility for ROM and sideways RAM users compatible with the BBC Micro, B Plus and Master series. Special introductory price is £9.99.

Watford Electronics will have no fewer than five new products at the show, including Ted, a teletext editor on two 16k ROMs available for around £40.

As well as creating teletext screens with ease, users can also produce their own presentations for shop displays or interactive information systems.

Watford also releases a new board giving the user 58k of RAM with Basic, View and Wordwise Plus, and no noticeable speed loss in execution.

The unit plugs into the processor socket and will sell for about £99.

The Watford Winchester Drive is a fully Acorn ADFS compatible 30Mbyte hard disc drive. The Watford Silicon Disc provides 512k of storage without any access overheads.

On exclusive preview will be Watford's View Printer Driver ROM, selling for between £15 and £20.

A major attraction at the show will be a series of teach-ins on the Master series. Visitors will be able to see the new micros in action and discuss them with a team of experts.

The teach-ins will be held in conjunction with the Walk-In Forum, which features talks by leading names in the BBC Micro field and question and answer sessions.

Search is on for top games writer

HOW would you like to earn £35,000 in just a few months? That's what Tim Tyler, author of the famous Repton games for the BBC Micro, has made in royalties so far.

Now Repton publisher Superior Software has launched a campaign to try and discover another Tim Tyler from the ranks of hobbyist programmers.

Managing director Richard Hanson told *The Micro User:* "This programmer recruitment drive is unique. Only a few companies have used full-colour advertising for this purpose before, and we are offering a free guidebook telling programmers how to get the best deal for their work.

Unbiased

"We have aimed at producing an unbiased, informative guide – although if a programmer phones me I'll give him many good reasons why he should let Superior Software publish his games".

The guidebook, Top Tips for Games Authors, contains a lot of sound advice. The section on submitting programs, for example, reads: "To maximise your earnings, ask for a royalty for every copy sold. This way you will benefit if the game sells really well.

"An outright payment will often be a compromise based on the performance of the company's other games. Don't accept any percentage based on profits – this is too vague a term".

String handler

NEW ROM-based software from Interface Electronics provides an extension to the string handling capacity of Wordwise Plus on the BBC Micro.

The ROM allows the user direct access to string slicing functions such as MID$, LEFT$, RIGHT$ and POS – the equivalent to Basic's INSTR.

By using these functions segment programs involving much text manipulation can be written quicker, will occupy less memory and will execute faster.

A total of 24 string handling functions are provided, along with a further eight commands, at a cost of £19.95.

ANALYSER

A DATA acquisition and analysis system based on the BBC Micro has been released by EG & G Instruments.

The Adcam multichannel analyser is capable of acquiring a spectrum via a photon detector, analysing the data and providing a spectral fingerprint of the sample.

A variety of data presentation methods are available and the colour display makes presentation clear and precise. Prices start at £4,000.

Space and a mobile micro

PETER Batson's BBC Micro is helping to make space technology more understandable to the public.

He uses his computer to display in simple terms signals from both weather and data satellites received at his new mobile exhibition unit.

He was for three years keeper and manager of the Manchester Air and Space Museum until its merger with the Science and Industry Museum.

"Having lost my job I borrowed £10,000 from the bank, and, with my £40 a week Government Enterprise allowance, had a 14 ft long trailer made to house my exhibitions".

He now tours schools, clubs and shows with what he now calls "Space Flight Projects".

"There is a lot of interest in the graphic displays, models of Sputniks and space capsules, but the BBC Micro commands attention", he said.

As well as the weather satellite receiver he has another which allows data from UoSAT to be displayed on his BBC Micro.

Detailed

"The computer sorts out signals giving technical information about the satellites and also very detailed news about space activities and general world news.

"I take the trailer to schools and shows. My aim is to increase awareness and understanding of the peaceful use of space technology and its place in the world. My BBC Micro has a big part to play in the exhibition".

● ***Pictured above: Peter Batson in his mobile exhibition***

HI-TECH HISTORY

TO mark the 900th anniversary of the Domesday Book Fearnleaf Educational Software has released a history package about Norman England for the BBC Micro, B Plus and Master 128.

The four programs look at life in an English village after the arrival of William the Conqueror, each dealing with a different section of 11th Century society. The suite is available on single disc or four cassettes at £35. Individual programs cost £12 on disc and £10 on cassette.

BBC MICROS SPEARHEADING YOUTH CLUBS JOBS DRIVE

BBC Micros are helping transform Britain's youth clubs into job "springboards".

To help develop youth working skills, Acorn has given eight BBC Micros on permanent loan for use throughout the country for both weekend and week long computing courses.

Mr Ed Berman, founder of Inter-Action, an educational non-profit making charity which aids clubs and organisations, says: "The BBC Micros will be taken by us to the national headquarters of various youth movements.

"We accepted the Acorn offer because most children do use micros in school and would have some knowledge of the machines so they could develop working skills more quickly.

"Very little organised computer activity takes place in youth clubs, yet these young people are the very ones who could make the most of the opportunity to explore computing.

"But it has to be set up as being more than computer games. Youth clubs could transform themselves into occupational springboards if they used computers like the BBC Micro in an imaginative way".

Delegates to Inter-Action's Community Computers UK conference discuss a program on a BBC Micro with Stepehn G. Anderson, from Community Computer UK (extreme right) and Trevor Marquis (front left) from the Honor Oak Youth Club, Lewisham

His theme was projected and expanded at a national conference on computer work in the youth service held aboard the Royal Princess on the Thames.

Another speaker was Mike Fordham, senior youth worker at the Honor Oak Youth Club in Lewisham.

He told how computers at his club catered for members from eight to 21 years. And he added: "They start with games and then progress into serious studies. I think within the next five years no one will be able to get a job stacking shelves unless they can use a computer to check the stocks. There is a real need for computers in youth clubs".

In 1984 he set up a small computer workshop and it served a purpose in making him aware of the demand for such a facility.

He said: "As with many new ideas the majority of the resistance came from adults who neither understood how to use computers nor were able to see their potential use.

"It was felt important that some form of 'educative' programme be arranged for staff before embarking on a major investment of time, energy and money".

Now the 200 members of his club have an opportunity to learn following the training of extra part-time staff.

The response was so great that the club set up a permanent workshop with four computers bought with donations from friends, Inter-Action, and also the local police who gave part of the proceeds of a lost property sale.

He said: "The only common bond is that we are all concerned to move away from a purely games approach and to use the computers as a development aid in our youth work".

English course enhanced

AN enhanced version of its Micro English language program has been released by LCL for the BBC Micro.

The course takes children aged eight through to O level standard. It includes an option for users to put their own words into the Speak-and-Spell section.

Any audio tape recorder can be used with the new version and back-up copies of the program tapes are included free.

The course consists of 24 programs on three cassettes, or two discs and a voice tape, and costs £24.

Candidate puts message across on a micro

JOHN Wallbridge, last month's Liberal Alliance local council candidate for Haringey in London used his BBC Micro, a Watford Digitiser and AMX's Pagemaker to get his message across.

"Using a computer to produce apparently personalised letters isn't new", he said, "but with this combination we can economically address a well-produced leaflet to 200 houses on a specific and very local issue.

"This would be too expensive using normal printing techniques. With continuous stationery it's time-consuming but it's cheaper than duplicating".

With limited funds the old-type literature had to be rather general and often sloganised. Now a question can be adequately dealt with in a visually attractive way far quicker.

"We're still trying to improve the illustrations", John said. "The digitiser doesn't lend itself to detailed pictures so we are practicing mixing digitised pictures with line drawings. It'll improve with practice".

"Another problem is that the digitiser needs a very good quality video signal to give of its best

"At present we're using a borrowed colour camera, but if it seems worth it we'll save up for a good second-hand black-and-white video camera which should give better results than a colour camera".

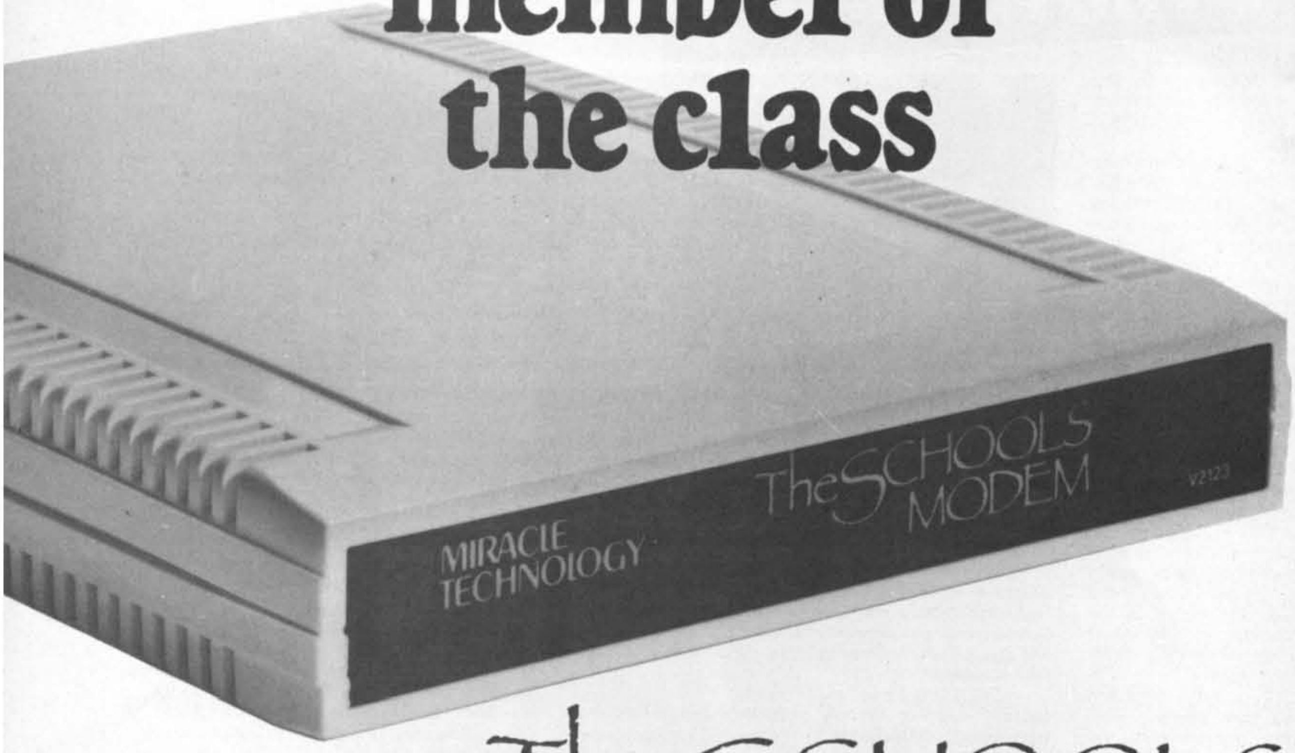
As Chairman of the Bulletin Board Operator's Steering Committee John is also interested in sending Pagemaker files by phone. The Association of Liberal Councillors already supplies cutouts for pasting-up.

"But a library of material on a bulletin board would be much more easily circulated and stored.

"We would have to use a transmission system rather like WeatherLink, but it would still only be developing the use of technology we already have", he said.

Yet even BBC Micro-based information technology can't guarantee political success. "It's going to take more than one election to break through here, even with the sophisticated equipment we're using", admitted John.

An intelligent member of the class



The SCHOOLS MODEM

When we designed a modem for schools, we didn't make any educated guesses — we ASKED teachers what they wanted.

"We need a fully intelligent V21/23 modem," you said, "because we want to use Prestel* and educational databases like Schoolink* and TTNS*. We'd like Hayes compatibility, so we have a good choice of software. With autodial and autoanswer please, and so user-friendly a child can handle it. Cost counts, so it must be inexpensive NOW, but upgradeable LATER so it doesn't become obsolete when our needs change."

We listened to what you said. Then we designed the modem which gives you everything you asked for. We called it The Schools Modem. At £149.95 exc. VAT, no classroom should be without one.

Packages for most schools' computers, and a variety of optional extras, are available. Please contact us for details.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.

*Registered trade marks of the companies concerned

MIRACLE TECHNOLOGY

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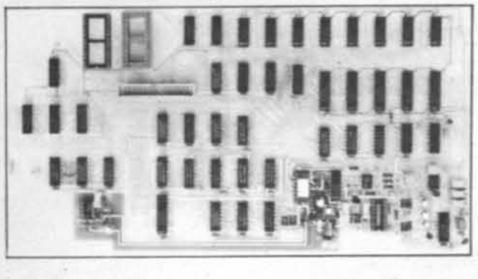
CUTTING THE COST OF IMAGE PROCESSING



THE Hawk V8, a real-time image processing system for the BBC Micro, has been launched by Wild Vision for £970.

It consists of a large printed circuit board mounted inside the micro and an image processing software package. Video images from a camera are digitised and loaded directly into the micro's graphics display memory.

Wild Vision claims that the direct memory access method provides a system with a performance comparable with high speed framestores.

Medical

The system, developed in conjunction with Mari Advanced Microelectronics and the Tyne and Wear Innovation Centre, has already been used in a medical application studying foot pressure patterns.

Other uses include video measuring and analysis with equipment such as microscopes and infra-red cameras, research and experimentation with image processing techniques, industrial inspection and automation, security systems, CAD and slow scan TV systems.

The Hawk V8 is the first frame grabber and direct memory access system of its type costing under £1,000.

Toolkit upgrade

AN upgrade of its Brom Toolkit chip has been released by Clares Micro Supplies.

Brom Plus contains sections dealing with discs and memory as well as the previous section of Basic utilities.

It retains and improves the full screen editor with additional facilities including a fast cross referencer and an intelligent pack routine that correctly creates multi-statement lines.

A selective multiple file copy and delete are among the new features. The general section deals with function keys, case input, memory edit and find commands, and ROM commands. The price is £34.50 and upgrades for existing Brom users are available.

Teachers launch their own software

EDUCATIONAL software for the BBC Micro written by teachers for teachers has been unveiled at a special publishing event held at the Computer Education Centre, Liverpool Polytechnic.

The authors all teach at schools in the Mersyside and Cheshire areas and the five new items of software are designed for primary school use.

Paul Collins of Prescot Junior School has written a Computer Managed Mathematics Scheme for infant children which demonstrates the need for cooperation between parents and teachers and illustrates how the BBC Micro could become a tool to help the overworked class teacher. The package includes a booklet and two discs and costs £15.

Stephen Hughes of New Brighton Primary School investigated the editing facilities of educational software which uses teletext graphics like those of Ceefax and Oracle.

His program, Teletext Editing in the Primary School, contains recommendations for the editing facilities of teletext editors and discusses and compares commonly used teletext packages. Booklet and two discs cost £15.

Handicapped

Tim Kendall, from St. Joseph's School, Birkenhead, is the author of Spell It and Post a Word, a suite of programs to aid the teaching of reading in infant and junior schools. Booklet and one disc together cost £9.

The needs of handicapped children at Clatterbridge School inspired Gareth Green and Ian Crossley to produce Gamma Word Processor, a suite of programs to enable children with special needs to follow a normal syllabus in English and mathematics.

The programs can be used with a two-switch input or with a normal keyboard. Booklet plus one disc cost £10.

Malcolm Glover of Thelwall Primary School wrote Switch It, software that uses the micro as a resource to develop children's ability to replace synonyms within a framework of creative writing.

Three discs plus a booklet cost £16.

Already available in the Computers in the Classroom series from the Computer Education Centre are programs on nuclear physics, computer studies, soil erosion, plant transpiration, matrices, optoelectronics, and a guide to Logo.

WATFORD TAKES OVER ARIES RAM

WATFORD Electronics has acquired the worldwide patent and manufacturing rights for the Aries Shadow RAM technology.

It has come as part of a five figure deal in which the leading supplier in the BBC Micro market purchased all the products of Aries, the company behind the Shadow RAM system.

As a result of the deal the exclusive rights to the Aries B20 and B32 RAM cards, the B12 ROM board and the B488 IEEE interface also pass to Watford.

It has already announced that it will continue to sell both Aries and Watford RAM boards and supply Aries dealers under the original terms.

The agreement between the two companies was reached following eight weeks of negotiation initiated by the managing director of Aries Peter Headland.

Although Aries has now ceased trading Headland has been retained as a consultant by Watford Electronics.

"We are particularly pleased to have acquired the rights to the Shadow RAM", said Nazir Jessa managing director of Watford. "There are 300,000 people out there who own standard 32k BBC Micros and every one is a potential customer".

Nazir insists that this latest acquisition by his company demonstrates his continuing faith in the BBC Micro market.

"People ask me if I should consider moving into other markets, but why should I?

"As far as I am concerned the BBC Micro market has been and always will be the best market to be in. I'm certainly staying in it".

BUG EYES
2
STARMAN TO THE RESCUE!
Audiogenic
ELECTRON
BBC

SPACE agent Starman is back with his rescue missions in Bug Eyes II for the BBC Micro.

Audiogenic Software's sequel to Bug Eyes has the daring hero in the rusting hulk of a flagship trying to retrieve 25 keys and save the entombed Zelda.

Cassette price: £7.95.

GAMESTERS COLLECT PRIZES

RESULTS of two competitions based on games from Superior Software for the BBC Micro have been announced.

Each successful entrant to the Repton 2 competition, which involved completing all 16 screens of the game, received a colourful T shirt. Winner of the draw, for which all correct entries qualified, was Simon Irwin of Hockley, Essex, who received £200.

Competitions were also held in connection with the graphic adventure Citadel. Chee Mann from London was the first person to find two of the three hidden crowns and received a prize of £100.

Wayne Hawksworth of Derby was first to complete the BBC Micro version of the game and he was awarded £200 and an engraved shield.

Superior Software says Repton 3 will be released later this year. It will include a screen designer, character designer, more features and more screens than Repton 2, which was BBC Micro Game of the Year for 1985.

Cleaning up with a BBC Micro..

SYSTEMS and turnkey house Beamjoy has developed a suite of programs running on the BBC Micro under CP/M for use by contract cleaning businesses.

Beamjoy says the system is suitable for use in office, window or general cleaning operations of all sizes and is available under concurrent CP/M and PC/DOS operating systems, with an MS/DOS version soon to be released.

The system records contract and job details, including work specifications and site addresses, plus contract charge and cost information.

It handles automatic printing of job tickets for use by cleaning staff and signature by clients, and automatic generation and printing of invoices, with summary information showing income, cost and profitability.

The system, which costs £150, can also be linked to Beamjoy's business software which provides automatic update of client sales accounts and full sales analysis by chosen headings.

MICRO SURGERY

COMPUTER Room is taking the BBC Micro to the doctor's surgery. Already a number of general practices ranging in size from 3,000 to 13,000 patients have taken up the Micromedic system.

The software covers an age and sex register; patient group search which identifies people who have high blood pressure or who smoke; immunisation recalls and repeat prescriptions.

The price is £850 but a total package including a BBC Micro, printer, disc interface, 800k disc drive and probably a monitor, comes to a combined cost of £2,000.

Micro training for dyslexia

A UNIVERSITY team is hoping for a breakthrough to help those suffering from word blindness – dyslexia.

Expert teachers have been combining their knowledge for two years at University College, Bangor, North Wales, to produce an educational program for use on BBC Micros.

Professor of Psychology Tim Miles said: "We are pooling the experience of the university's dyslexia unit, in collaboration with the British Dyslexia Association, to provide a program for computer training to correct both spelling, reading, arithmetic and other areas which they may find difficult.

"Ideally we want a child to make sounds into the machine which will then recognise them and produce words.

"But to find the right program may take us another two years because they need multisensory teaching – vision, hearing and even perception of movement.

"Also there is a need for pictures associated with words and letters and graphics to assist both children and educated dyslexia students".

Director of Teaching at the Dyslexia Unit at Bangor is Mrs Ann Cooke, a former student of the college.

She said: "There are a lot of programs around for people who have difficulty spelling which are not really suitable for the complex problems attached to dyslexia".

Mrs Cooke, 12 years with the university unit, is one of the team advising and putting up ideas for the sort of areas needed for the program.

"It is a team effort which we feel will finally produce something which will really help both teachers and children".

e British
omputer Society

Jack Squires, British Computer Society branch chairman, presents a BBC Micro to the winning Colbayne High School team captain Andrew Simpson, 17, watched by Gyles Harvey, 15, and David Schilder, 16.

BBC MICRO FOR QUIZ WINNERS

THREE teenagers from Colbayne High School, Clacton, fought out a tense tie breaker before winning the East Anglia section of the British Computer Society's schools computer quiz.

The contest was open to all secondary schools in Norfolk, Suffolk and north Essex, with the winners receiving a BBC Micro for their school and free membership in the Association of Young Computer Enthusiasts.

Runners up were Orwell High School, Felixstowe, who eventually lost by only four points, and Gaywood Park High School, King's Lynn. Their teams also received free membership in AYCE, as well as disc drives for their schools.

Prices were sponsored by Norwich Union Insurance Group, Willis Faber & Dumas, and Martin Marietta Data Systems, and provided by Viglen Computer Systems.

The Colbayne High School team now goes forward to the regional finals of the national competition.

WP for schools

SOMERSET Local Education Authority has placed an order for 500 copies of Logotron's Pendown, a word processing system for BBC Micros.

Somerset's County Adviser for Computer Education David Woodward said: "It offers great potential for schools as it is a word processor designed just for children.

"We have already received a very encouraging response from the primary and secondary schools in our area and there is every possibility we will be ordering further units".

The printer operation is all software controlled to enable scope for both teacher and pupil experimentation with different typestyles in addition to the six styles provided.

The dictionary can also be extended as a child's vocabulary increases. The price to schools of £34 includes a manual and a 16k eprom.

KEEPING CLUB RECORDS STRAIGHT

AS any club secretary will know, keeping track of membership records can be a difficult problem.

For staff at the Mosses Community Centre in Bury, Lancashire, where the membership numbers almost 2,000, the task is a major headache.

But help has arrived in the shape of a BBC Micro and some special software that is the answer to a membership secretary's prayer. The Centre houses more than 40 different clubs and organisations covering interests ranging from old time dancing, through model railways and metal detecting to computers.

Staff are required to maintain an accurate and up to date list of members' names, addresses and other items of information to enable smooth running of the various activities.

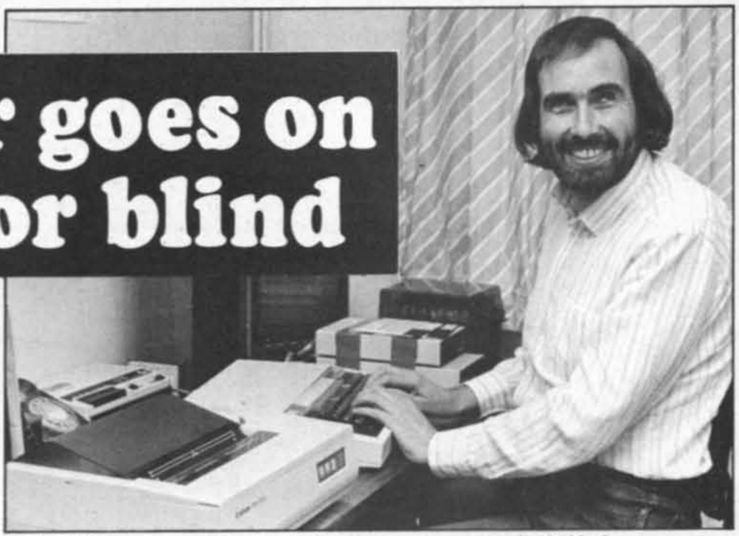
This has proved a difficult task in the past due to the disadvantages of using a complex and cumbersome card index system. It was time-consuming, difficult to keep up to date and prone to error.

But today the Centre has solved its problems with the help of a BBC Micro and software specially written by Geoff Turner, a regular contributor to *The Micro User*, who helps to run the computer club there.

With the system now fully operational, the staff are able to maintain an accurate record of the 2,000 people who use the Centre.

Data relating to any individual member or user group can easily be accessed, and new members can be added to the system easily and quickly.

Micro User goes on cassette for blind


David Calderwood . . . runs database and edits an audio magazine for the blind

A NEW resource has been created for blind BBC Micro users with the availability of *The Micro User* on audio cassette every month in conjunction with the Talking Newspaper Association.

It is the latest in a chain of developments for blind home micro owners which started in 1980 when Dr Tom Vincent of the Open University set up a project called Computing for the Blind.

The hardware he decided upon was the BBC Micro with a Votrax type speech synthesiser and this enabled him to produce a software package, Taling Basic, which allowed blind users to write programs in Basic just like sighted people.

The program was very user friendly and immediately became popular with the up and coming new breed of blind BBC Micro enthusiast.

Other specialised software flowed from the Vincent stable, notably a talking word processor which enables blind users to find the last word or part word they keyed if they were interrupted in their work.

More recently a screen reader has been developed by Paul Blenkhorn of Birmingham University's research centre for the education of the visually handicapped.

This allows the user to find out what is on the screen by means of a talking cursor. For example, when in screen reading mode, T takes the user to the top of the screen and D is used to drop down a line.

It is an important breakthrough because it can be used with commercial word processors like Wordwise Plus, and marks the transition from custom made to off-the-shelf software.

Last year a further advance was made when the screen reader was adapted to occupy sideways RAM, leaving the whole of the BBC Micro's memory available for the user's program. The blind are now able to use most text based software, including adventure games.

In 1983, David Calderwood, a blind BBC Micro user who had worked with Tom Vincent in evaluating his project's software, started the Visually Disabled User Group which runs a database of resources and a software library for members.

Calderwood also edits a quarterly magazine on audio cassette, Computer Talk, which carries software, news and contributions from members.

"Members have made a number of exciting breakthroughs in communications regarding the use of Prestel, teletext and RTTY", says Calderwood.

"The help of *The Micro User* in allowing its contents to be placed on tape will give further encouragement to blind computer owners and keep them better informed about developments in the industry.

"For their part I expect these new blind 'listeners' to *The Micro User* will start contributing their letters and ideas alongside those of sighted readers".

Readers of *The Micro User* who know of visually handicapped people who might be interested in computing with the BBC Micro can send for a demonstration of the VDU Group's system and details of membership to David Calderwood, Wenallt, Harlech, Gwynedd LL46 2UE, enclosing a good quality C90 cassette and return postage and packing.

Hamsters on the keyboard

SERVICE station manager Philip Bridges wants to see Hamsters spreading throughout the UK.

That is the new nickname for ham radio fans who are now using BBC Micros to enhance their use of radio.

Southampton based Philip is editor of the newsletter for Amrac – Amateur Radio and Computers – which serves licenced radio amateurs in the Hampshire, Sussex and Wiltshire areas.

"About 40 of our members are BBC Micro owners", said Philip.

"Although most of our members live in the South of England we do have a couple of members in the North. What we should like to see and stimulate is growth in this exciting new technique.

Handling inquiries is Tony Trigell (call sign GIJAF) of Gleness, East Boldre, Brockenhurst, Hants SO42 7WD.

Movie pack

SLIPPERY Slug has released its first software for the BBC Micro.

Movie Maker is a ROM-based graphics language producing animated films, but it can produce displays for almost any purpose.

The pack contains a cassette tape with an introductory movie on it and costs £29.90.

Oscars? Easy as ABC . . .

THE ABC Easy Word Processor by Acornsoft won two Oscars in the British Microcomputing Awards.

The writing tool for young writers from seven years and upwards gained the top award in both the home educational and the schools software sections.

The awards were presented by Dr. David Owen and the competition was jointly sponsored by the Sunday Times and Personal Computer World magazine.

Receiving the award from Dr Owen is Acornsoft marketing manager Jeremy Preston.

MicroLink
in association with
TELECOM GOLD
No. 10 June 1986

NEWSLETTER

MICROLINK TRANSFERS SPACE PROBE DATA

MICROLINK has been chosen to provide vital transatlantic communications for a project that will eventually push back the frontiers of space even further.

An organisation called Astra – Association in Scotland To Research into Astronautics – is experimenting with the design of a spacecraft that could travel millions of miles hopping from planet to planet and still survive a close encounter with the sun.

It is based on a concept known as Waverider, originated 20 years ago at Glasgow University by Professor Terence Nonweiler, where the vehicle flies at hypersonic speeds on the shock waves produced by its leading edges.

The project has attracted the attention of the Jet Propulsion Laboratory of the University of California which is working with NASA on Starprobe, a mission to fly within two miles of the sun.

The Americans see Waverider as the most serious contender for the role of Starprobe transporter because it can travel far into space by leaping from one planet to another, harnessing the gravitational force of each in the manner of a slingshot.

A leading member of the Starprobe team, James Randolph, has been to Scotland to see the work in progress. "Waverider is an ideal solution, perhaps the only one, to the problem of finding a vehicle with a high lift-to-drag ratio", he said after his inspection.

MicroLink's role in the project is to act as a fast and efficient medium for transmitting information from Astra in Scotland to the Jet Propulsion Laboratory in California.

"Wind tunnel test data and other data are constantly being assimilated and have to be passed on to JPL as soon as possible. Therefore we have turned to MicroLink as a cost-effective and rapid means of data transfer", said a spokesman.

Menu for a good night out

ALL the world's a stage, and nowhere more so than London where theatregoers have a choice of over 40 glittering shows.

Now, in association with renowned booking agency Edwards & Edwards, MicroLink can reserve your seat in the stalls at any of them.

TheatreLink is a new service from MicroLink incorporating every play, musical, thriller, comedy and opera – plus major reviews and cabarets – being presented in the capital.

This cornucopia of entertainment ranges from the evergreen The Mousetrap, through old and new favourites like Blithe Spirit, Cats and Run For Your Wife, to the new musical Time.

To help you make your choice, the menu not only gives a full alphabetical list of every show currently running in London but also breaks it down into categories such as musicals, plays, comedies, thrillers and so on.

And as well as performance times and seat prices, each individual show listing contains the names of the stars appearing and a helpful description of its theme.

Bookings on TheatreLink can be made 24 hours a day, seven days a week up to the day before the performance you wish to attend. Seats for Friday and Saturday performances must be booked at least two days in advance.

Reservations will be confirmed on your mailbox within an hour if you book between 10am and 4.30pm, Monday to Friday.

Tickets will be charged to your credit card and either posted to you on the same day or held at the box office of the appropriate theatre.

TheatreLink is menu driven for maximum user-friendliness and also incorporates a section giving all the latest show news and a breakdown of which theatres still have seats available for performances during the current week.

Airlines guide goes on-line

AIRLINE travellers with a subscription to MicroLink have entered an era of trouble-free and more economical flight arrangements.

The reason is that MicroLink now provides instant round-the-clock information from the bible of globetrotters, the International Official Airlines Guide.

Known as OAG, it offers the very latest data from more than 750 airlines world-wide, with details of 1½ million flights.

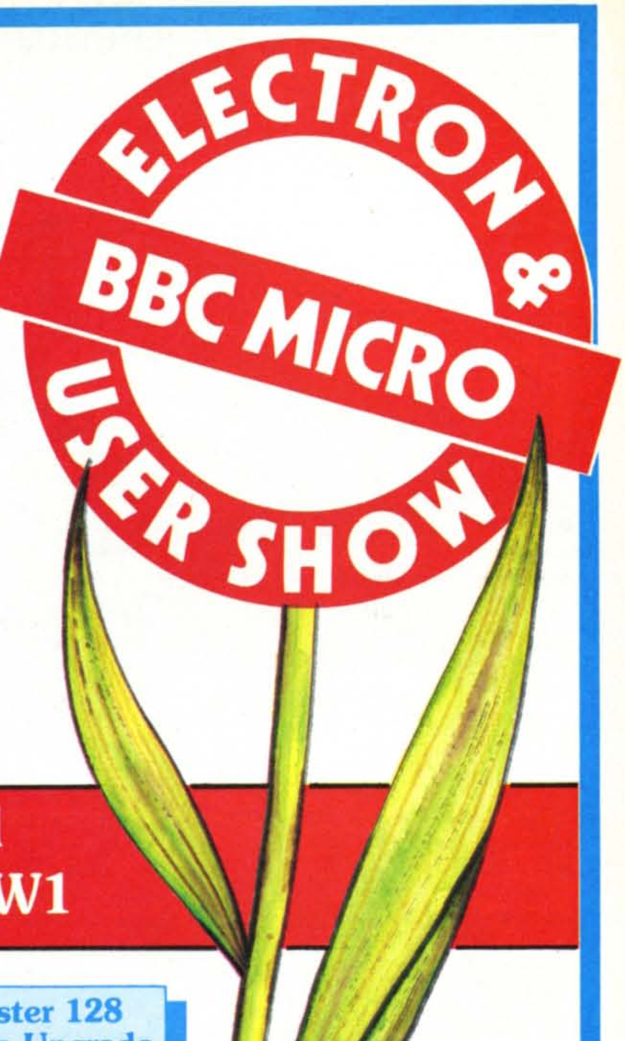
MicroLink subscribers can be connected within seconds via satellite to the OAG computer in Oak Brook, Illinois, which monitors the 38,000 changes in fares which take place daily, and the 30,000 weekly schedule revisions.

And OAG is a real money-saver because all the fares for each airline on any given route are accessible from the lowest to the highest.

The service also boasts an elapsed time feature which takes into account any stopover time during flights, thus enabling the passenger to select the journey with the shortest possible duration.

The OAG service is easy to use. It will accept full spellings or airline codes of destinations, and the user can select information either by single line entries or by using prompts on the system.

YOUR chance to join MicroLink – Page 93



The show that gives you the FIRST look at all the latest hardware and software now being produced for the BBC Micro and Electron

Friday to Sunday, May 16 to 18

Royal Horticultural Hall
Westminster, London SW1

Problems? Then this is the show where you'll find the answers! Leading experts in all aspects of the BBC Micro and Electron will be there to lend a helping hand – whether you're a beginner or an advanced user.

See the BBC Master 128 and Master Turbo Upgrade – first of the exciting new generation of BBC Micros

Lots of bargain bundles

. . . as suppliers clear the decks for all the new season's products

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ROBIN NIXON's Rainbow provides . . .

Colour without keys

IT'S been a while since we published anything on interfacing light pens for the BBC Micro. So for those of you who have light pens here's a treat in the form of a versatile CAD package – Rainbow.

Rainbow works in Mode 1 thus giving four ink colours. It can:

- Draw rubber banded lines.
- Draw rubber banded rectangles.
- Draw rubber banded circles.
- Flood fill enclosed areas.
- Provide several brush sizes and shapes.
- Five drawing speeds.
- Save pictures.
- Load pictures.

In fact the only main feature it doesn't have is a screen dump to printer. This is because there are so many different printers and printer dumps that it was felt logical to leave dumping a saved screen up to you.

Rainbow has been made as easy to operate as possible. There is no need to touch the keyboard at all.

All of Rainbow's functions are represented at the top and bottom of the screen as icons which can be accessed by pointing the lightpen at them. You can see these icons along with explanations of their functions in Figure I below.

At start-up certain icons have been pre-selected: the *Ink* is set to blue, the drawing *Speed* is 3 and the *Pen* has been selected.

On the screen you will see a flashing square box. This is the *Nib* of the *Pen, Brush* or other icon you are using.

If you point the lightpen at the middle of the screen and hold it still until the computer beeps the *Ink* will be turned on and if you then move the pen it will draw. Again if you hold the pen still the computer will beep and the *Ink* will be turned off. All of Rainbow operates in this manner. The idea is to prevent the need to press a key and to allow you to position the *Nib* exactly where you want it before any drawing takes place.

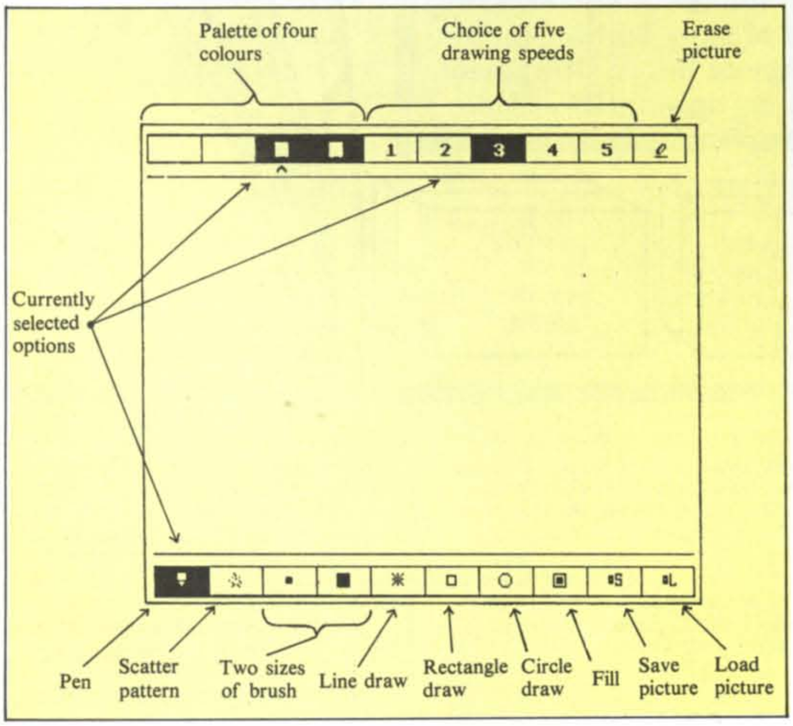


Figure I: Explanation of Rainbow's icons

Once you've typed the program in try practising with the pre-set options.

At the top of the screen there are 10 icons. The first four control the colour of the *Ink* and the next five control the *Nib's Speed. Speed* 5 is quite slow and so is ideal for intricate design work, as any slips of the *Nib* will result in minimal errors. On the other hand *Speed* 1 is very fast and is useful for drawing large objects.

The tenth icon is *Erase*. To avoid accessing this function accidentally you must hold the lightpen over it until it beeps twice. When you've finished practising with the top set of icons try out *Erase*.

Now for the bottom 10 icons. The first is the one you have been using until now, the *Pen*. The next icon is *Scatter*. This works in the same way as the *Pen* but draws a pattern of scattered dots.

The next two icons are the small and large *Brushes*. These also work in a similar way to the *Pen* except that the *Ink* comes out in one of two larger sizes.

Icon 5 at the bottom is *Line* draw. If you take a look at Figure II you'll see that *Line* draw enables you to drag a line around until it is exactly where you want it before placing it on the screen.

When you hold the lightpen still the first beep tells you that the computer has remembered the position of the *Nib*. As you move the pen about a line is dragged until you hold it still again, whereupon the line is placed on the screen.

The next icon *Rectangle* draw is similar to *Line* draw except that you can drag rectangles around the screen.

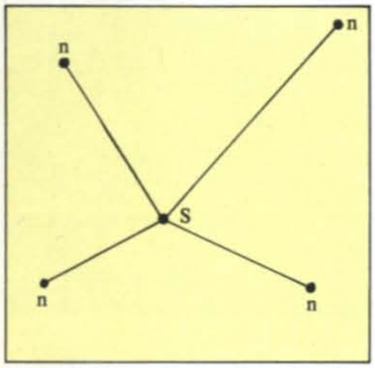


Figure II: Using rubber-banding to drag lines from start position (S) to Nib position (n)

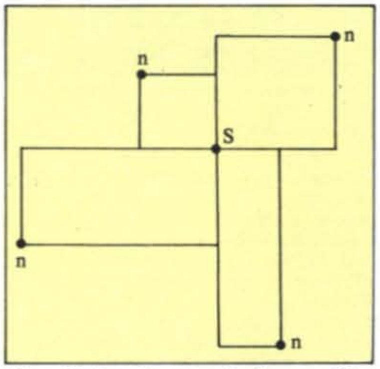


Figure III: Dragging rectangles from start (S) to Nib position (n)

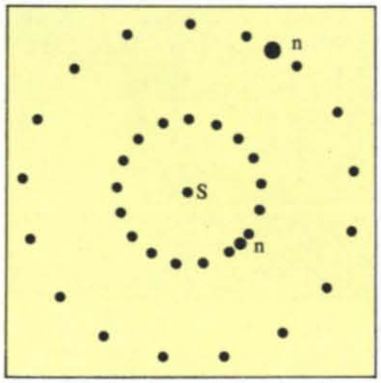


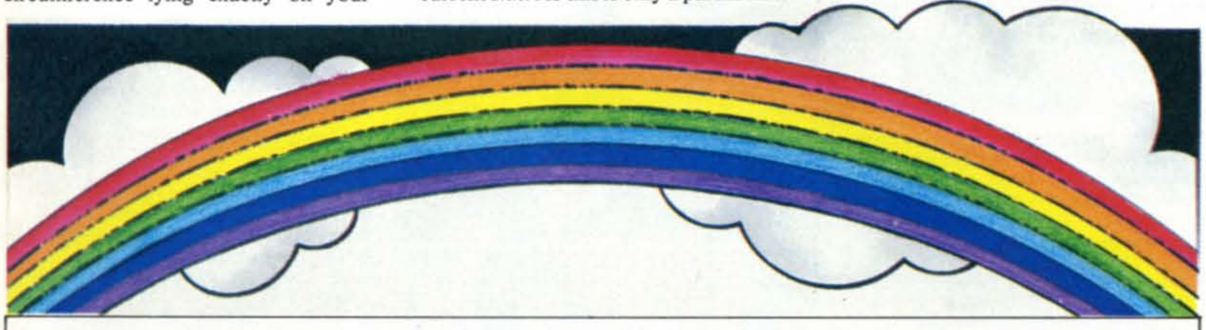
Figure IV: Dragging a circle's circumference from start position (S) to Nib position (n). Until the circle is drawn on the screen it is represented by a number of dots.

Figure III shows how this works.

Looking at Figure IV you will see that the seventh icon *Circle* draw is slightly different from the previous icons. Once you've held the lightpen still for the first beep you will see a series of dots in the form of a circle appear, with the circumference lying exactly on your new *Nib* position. The dots are used because drawing circles in Basic takes a long time and you would not be able to achieve the real time dragging effect.

The *Fill* icon is a partial fill routine. When you hold the lightpen still, the area underneath will be filled with the current *Ink*. As this is only a partial fill it may take three or four goes to fill in an object.

Finally, the last two icons are *Save* and *Load* picture. As their names suggest these options will either save or load the picture to or from disc or tape. The picture will be saved under the file name *PICTURE*.



```
  100 REM *************************
  110 REM *                       *
  120 REM *  LIGHTPEN RAINBOW     *
  130 REM *                       *
  140 REM *   By Robin Nixon      *
  150 REM * (c) The Micro User    *
  160 REM *                       *
  170 REM *************************
  180 REM
  190 MODE7:IF ?&220=32 GOTO280
  200 FOR PASS=0 TO 2 STEP 2:P%=&900:
[OPT PASS:LDA &220:STA &230:LDA &221:
STA &231:LDA #start MOD &100:STA &220
:LDA #start DIV &100:STA &221:LDA #14
:LDX #4:STX &74:JSR &FFF4:RTS
  210 .start
  220 STA &70:PHA:TXA:PHA:TYA:PHA:PHP
:LDA #13:LDX #4:JSR &FFF4:LDA &70:CMP
 #4:BNE exit:LDX #16:STX &FE00:LDA &F
E01:LDX #17:STX &FE00:LDY &FE01:STY &
71:STA &72:SEC:LDA &71:SBC #4:STA &71
:LDA &72:SBC #6:STA &72:LDX #0
  230 .loop
  240 INX:SEC:LDA &71:SBC #80:STA &71
:LDA &72:SBC #0:STA &72:BPL loop:BEQ
loop:DEX:STX &72:LDA &71:ADC #80:STA
&71
  250 .exit
  260 LDA #14:LDX #4:JSR &FFF4:PLP:PL
A:TAY:PLA:TAX:PLA:JMP (&230):]NEXT
  270 CALL&900
  280 PROCinitcircle
  290 *TV0,1
  300 *OPT 1,0
  310 MODE1:VDU23,255,255,129,129,153
,153,129,129,255,19,2,4,0,0,0,28,0,1,
39,0,23,252,255,255,255,255,255,255,2
55,255,23,251,0,0,60,60,60,60,0,0,23,
253,0,0,0,24,24,0,0,0,23,243,255,129,
189,189,189,189,129,255
  320 VDU23,250,16,8,34,0,130,33,20,3
4,23,249,62,62,62,62,0,28,8,0,19,0,3,
0,0,0,19,1,7,0,0,0,19,3,5,0,0,0,23,24
0,73,42,20,107,20,42,73,0,23,241,0,12
6,66,66,66,66,126,0,23,242,60,66,129,
129,129,129,66,60,23,244,14,26,50.100
,104,112,0,255
  330 VDU23,245,15,233,232,175,225,23
3,15,0,23,246,8,232,232,168,232,233,1
5,0
  340 COLOUR129:CLS:COLOUR129:VDU28,0
,28,39,3:CLS:VDU28,0,31,39,30:COLOUR1
```

Turn to Page 109

NEW BBC PRODUCTS FROM CLARES

BETA-ACCOUNTS £25

STATEMENT AND ACCOUNTS RECEIVABLE MODULE

This module uses the transaction files created by the INVOICE module to prepare statements at regular intervals. The statement run is totally automated once security backups have been completed and will save hours of work every month. The Accounts Receivable allows you to enter all outstanding debts for an account and it is then automatically kept up to date by the invoice program. All payments received are entered into the accounts receivable file and allocated against the outstanding account.

In addition to the time saving operations performed by this module you can also obtain valuable management information such as debtor lists, which can be printed together with telephone numbers. It is also possible to query any particular account and obtain an up to date picture of the position.

STOCK CONTROL MODULE £25

The stock control module is used in conjunction with the invoice program and is updated whenever an invoice is issued. It is then possible to automatically search the stock file for out of stock or re-order level items. Purchase orders can then be printed, automatically if required.

As with the Accounts Receivable there are many forms of management information available including stock numbers and values both numerically and as a percentage figure. This enables you to identify slow or fast moving parts easily.

A parts explosion option is also available for just £10 extra.

A twin double sided drive is required for the STOCK CONTROL module.

Ask for a full data sheet

FONTWISE PLUS £20.00

Due to the phenomenal success of FONTWISE we just had to make FONTWISE PLUS compatible with VIEW as well as WORDWISE and WORDWISE+, at your insistence!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
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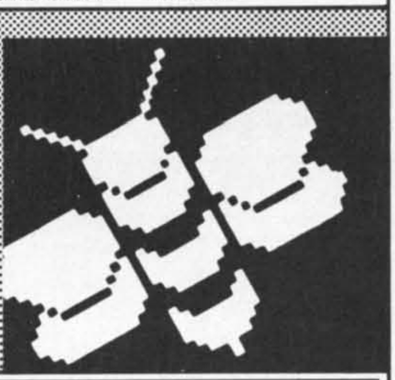
If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.



MACROM £40
£35 DISC

MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

Ask for a data sheet today DEPT MU1

BROM PLUS £34.50 £30 DISC

BROM was yet another of our runaway successes and such has been the demand for extra features that we have now produced BROM PLUS. Most of the original BROM favourites are there plus a whole host of additional commands to aid you, the user.

Commands include:

- EDIT - a FULL SCREEN EDITOR, not to be confused with the line editor used in other toolkit ROMs
- ERROR ON traps errors and enters the EDITOR
- FIND all occurence of a string or keyword and enter the editor, TAB will find the next one and so on
- SCHANGE a search and replace facility
- LCOPY & LMOVE allow you to copy and move lines
- PACK is a very powerful routine which removes REMs & spaces and forms multi statement lines in a very intelligent way
- RENUM is a partial renumber facility
- XREF allows you to cross reference your program
- COMPARE a file against memory
- DEDIT a robust disc sector editor
- DFIND to search a disc for a string
- DGET/DPUT to load or save sectors
- FORM allows you to format up to 4 disc sides
- MENU to load programs from a disc with a BROM menu
- XCOPY to selectively copy files from disc to disc
- XDEL to selectively delete files from a disc
- MEDIT to view and edit memory - FAST
- ROMLIST lists all ROMs and their current status
- ROMON & ROMOFF which enable you to turn on/off sideways ROMs even after CTRL/BREAK.

"This is the best BASIC screen editor I have so far used."

MICRO USER August '85

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TECHNOMATIC

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ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1130 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard on Acorn Winchesters. Non Acorn drives are fully compatible with the Acorn ADFS system and Torch Z80 system and offer a good value for money.

Acorn 10 Mbyte Winchester	£1100 (a)
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5 Mbyte Hard Disc	£600 (a)
20 Mbyte Hard Disc	£1025 (a)

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EPROMs/RAMS

2764-25	**£2.00 (d)**
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6264LP-15	**£3.40 (d)**

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. £162 (b)

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. £299 (b)

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £229 (a)

TZDP240: ZEP100 with TECHNOMATIC PD800P dual drive with built in monitor stand. £469 (a)

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

ROBOCOM BITSTICK I	£299 (a)
ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package.	£775 (d)
Upgrade for Bitstick I to II	£415 (b)
Bitstick Multiplotter Driver (most popular plotters included)	£69 (b)
Epson FX80 Screen dump routine for Bitstick I	£35 (d)
Epson FX80 dump for Bitstick II	£39 (d)

DISC DRIVES

All drives listed below are fully compatible with single and double density DFSs. The larger capacity referred to below is for the Acorn's ADFS system.

Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

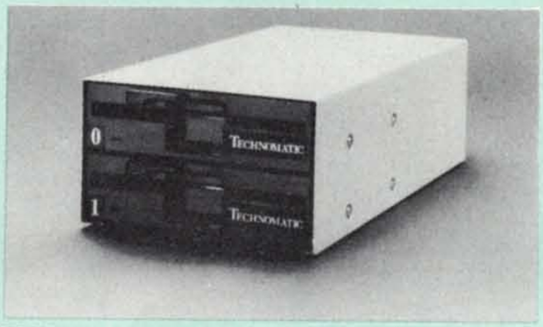
The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2 × 400K/2 × 640K 40/80T DS **£269 (a)**

PD800



TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£249 (a)**

TD800 (as PD800 but without the psu) **£225 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

TS400 £109 (b) **PS400** with psu **£129 (b)**

3.5" DRIVES

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

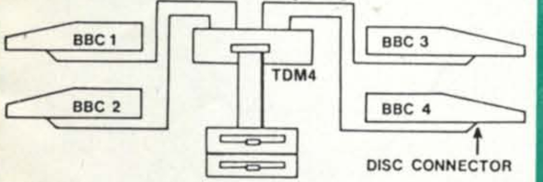
1 × 400K/1 × 640K 80T DS : **TS35 1** £109 (b); **PS35 1** with psu £124 (b)

2 × 400K/1 × 640K 80T DS : **TD35 2** £199 (b); **PD35 2** with psu £219 (b)

TD35 2

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) £135 (a)

TDM2 Dual Unit (2 computers) £75 (b)

DISC STORAGE BOXES

NON LOCKABLE **DB530** 30 × 5¼" £6.00 (c)

LOCKABLE **DB340** 40 × 3½" £8.50 (c)

DB550 50 × 5¼" £9.50 **DB570** 70 × 5¼" £11.00 (c)

DB5100 100 × 5¼" £13.00 6b)

3M 5¼" FLOPPY DISCS

40 T SS DD	£10.50
40 T DS DD	£12.75
80 T SS DD	£14.75
80 T DS DD	£16.00

(£1 extra for library case packing)

FREE SWISS ARMY KNIFE for every three packs of discs.

3M 3½" FLOPPY DISCS

80 T SS DD £18 (d) 40 T DS DD £25 (d)

Discs in packs of ten

Available at the new greatly reduced prices (for limited period only)

SPECIAL BULK DEAL

High quality **5.25"** with our usual lifetime warranty. The discs are packaged in a lockable plastic box.

50 Single Sided 40 track Double Density	£42.50 (b)
50 Double Sided 40 track Double Density	£55.00 (b)
50 Double Sided 80 track Double Density	£65.00 (b)

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. 5¼" £14.50 (d)

Floppiclene with 20 disposable cleaning kits. 3½" £16.00 (d)

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

MAIL ORDER
17 Burnley Road
London NW10 1ED

RETAIL SHOPS
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
Telex: 922800
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

EPSON PRINTERS

LX80 a low cost high performance printer with NLQ and a variety of other fonts and graphic modes. 100cps. Friction feed as standard.

LX80 £195 (a) **Tractor Feed** £20 (c)

FX Range: A new range to meet virtually every type of computer printing requirement from correspondence quality text printing to a variety of fonts, to 7 different graphic modes. Fully IBM compatible. 8K buffer for data storage or upto 240 user defined characters. 160cps.

FX85 £315 (a) **FX105** £449 (a)

A limited no of FX80s available at £260 each.

LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800	£495 (a)	**LQ1000**	£729 (a)
LQ1500 (2K)	£875 (a)	**LQ1500 (32K)**	£950 (a)

TAXAN PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col)	£220 (a)
KP910 (156 col)	£379 (a)

NEW
JUKI 5510 PRINTER

A new dot matrix printer from the reliable JUKI stable. Features include a fast 180 cps. NLQ at 40 cps. Full EPSON/IBM compatibility. 3K buffer as standard expandable to 15K. Full graphics capability and a variety of fonts including international characters set. Can be upgraded to a seven colour printer. Sheet feeder available as optional extra. £229 (a)

COLOUR PRINTERS

EPSON JX80 4 colour.	£420 (a)
Integrex Colour Jet Printer.	£549 (a)
Canon PJ1080A	£369 (a)
JUKI 5510 colour upgrade.	£99 (b)

CENTRONICS GLP

A NLQ printer at an affordable price. Fully compatible with Epson control codes offering a variety of fonts including super and subscripts, and a variety of graphic modes. Serial and parallel interfaces fitted as standard. Friction feed as standard. £109 (b) Tractor feed £14 (d)

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3 K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 £285 (a)

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for maximum reliability.

JUKI 6100 £289 (a)

DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro. DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but unlike all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for using in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

Suitable for use with printers fully compatible with EPSON quad density graphics.

In short this one rom not only will provide professional NLQ facilities, but also a vew printer driver and a font designer/editor for onlv £28 (d) **DOTPRINT** Dual for MX Range. £28 (d)

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on most EPSON printers within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer £75 (d)

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

Available in 64K and 256K versions

TSB 64 £199 (b) **TSB 256** £275 (b)

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea).	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

BBC Computer Sharer: TCS26:
1 computer to 2 printers
fitted with Cable. £19.50 (c)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, eclipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

Epson HI-80 Plotter £325 (a)

HITACHI 672 PLOTTER

A high speed, compact A3 plotter with 4 colours and high accuracy. Both serial and parallel ports as std. Plots on either OHP film or plain paper. Operates on HP GL or single character commands and is easy to interface to most graphics software. £465 (a)

GRAPHICS PLOTTER

Available again with considerable enhancements to the original model. Plotting area has been increased to A3 size with a resolution of 0.1mm. Opto sensor converts the plotter into an input device to scan and digitise pictures, traverse mazes and investigate methods of artificial intelligence. A more powerful drill/router attachment and scriber provide facilities for drilling on various materials and fine line drawing on coated materials.

Total cost: £629 (a)

Basic plotter and accessories available separately. Send for details.

PLOTMATE

From Linear Graphics a fast, accurate and easy to use plotter.

The A4 Plotmate is the ideal drawing companion for all BBC micros, the Master and Cambridge Work Station. Plugs into the user port or printer port of your BBC Micro and directly driven by the BBC graphics commands in BBC Basic, Logo or indeed any high level language without additional driver software.

Plots onto paper, card or acetate film in up to 6 colours using fibre, OHT or ballpoint pens.

A4 Plotmate £299 (a)

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£28 (d)
8148 + RS232 + 8K	£75 (d)
8165 IEEE + Cable	£65 (d)
8148 RS232 + 2K	£57 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£37 (c)
FX80/80 + Paper Roll Holder	£17 (c)
LX80 Tractor Feed	£20 (c)

SHEET FEEDERS:

8338 LX80	£49 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
8330 RX80 +	£129 (b)

Ribbons:

RX/FX100/100 + . FX105	£10 (d)
RX/FX80/80 + , FX85	£5 (d)
LX80	£4.50 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	£7.50 (d)
KP910	£7 (d)

TAXAN CANON Accessories:

RS232 + 2K buffer	£78 (d)
Ribbon	£6 (d)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£129 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£182 (a)

BROTHER HR15

Daisy Wheel	£18 (d)
Tractor Feed	£90 (a)
Ribbon (Carbon/Nylon)	£3.00 (d)
Sheet Feeder	£182 (d)
Keyboard	£135 (a)

Printer Leads:

BBC Parallel Lead (1.2m)	£6 (d)
BBC Serial Lead (1.2m)	£6 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½" × 11"	£13 (b)
2000 sheets 14½" × 11"	£18.50 (£4.50)

Labels/1000:

Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

- Will enable running of almost any CP/M applications software
- Will enable transfer of data between different disc formats
- Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8″ cables.

Twenty eight CP/M formats are supplied which include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo . . . we also offer to configure other formats at an extra charge.''

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

- The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
- Interchange of valuable data and files among users of various CP/M computers.
- Using a system at home for preparing data required in the office.
- Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possile on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

SPECIAL MULTIFORM UTILITY to read and write to IBM PC Disc. £75 (d)

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

WORDSTAR PROFESSIONAL £310 (a)
WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

SAGE ACCOUNTS: This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. £375 **Sage plus** (£695) for the larger business, and **Sage Payroll** (£195)

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at £75 (b). Please phone for other trainers.

TORCH GRADUATE IBM SOFTWARE: We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy	£16.95 (c)	Multimate Complete Guide	£16.95 (c)
Introduction to Wordstar	£17.95 (c)	ABC of LOTUS 123	£15.95 (c)
Wordstar Handbook	£11.95 (c)	The RS232 Solution	£17.95 (c)
dBase-II for the first time user	£16.95 (c)	CP/M Bible	£15.95 (c)
Understanding dBase-II	£22.95 (c)	Soul of CP/M	£14.95 (c)
Understanding dBase-III	£22.95 (c)	CP/M Handbook	£14.95 (c)
Multiplan Made Easy	£18.95 (c)	Mastering the CP/M	£17.95 (c)
		Computer Spreadsheets	£7 (d)

(no VAT on books)

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Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

MONITORS

(All Monitors supplied with BBC Lead)

RGB MONITORS

1431 14″ RGB Std Res	452 × 585 pixels	£179 (a)
1451 14″ RGB Med Res	653 × 585 pixels	£229 (a)
1441 14″ RGB Hi Res	895 × 585 pixels	£375 (a)

MICROVITEC 14″ RGB/PAL/Audio

1431AP 14″ Std Res	452 × 585 pixels	£199 (a)
1451AP 14″ Std Res	653 × 585 pixels	£275 (a)

The above monitors are available in plastic or metal case.

MICROVITEC 20″ RGB/PAL/Audio

2030CS 20″ Std Res £380 (a) **2040CS** 20″ Hi Res £685

TAXAN 12″ RGB

K12SV3: A high performance high res monitor with desk matt screen with options to switch to monochrome green/amber. IBM Compatible £330 (a)

MITSUBISHI XC1404 14″ Med Res RGB:

BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. £229 (a)

MONOCHROME MONITORS

TAXAN

KX1201G 12″ HI-RES green etched screen	£90 (a)
KX1203A 12″ HI-RES amber etched screen	£105 (a)

PHILIPS

BM7502 12″ HI-RES green screen	£75 (a)
BM7522 12″ HI-RES amber screen	£79 (a)

ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)			£20 (c)
Taxan Swivel Base for mono monitors with integral clock			£22 (c)
Philips Swivel Base			£14 (c)
Monitor Stand. BBC B + B	£10 (c)	Master	£12.50 (c)
Double Tier Plinth. BBC B + B			£19.50 (b)
Taxan RGB Cable	£5 (d)	Microvitec RGB Cable	£3.50 (d)
Monochrome BNC/PHONO Cable			£3.50 (d)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational users. Supplied with a users handbook and utilities disc containing starter programs and development software.

Touchtec 501 £255 (b)

EPROMER II

EPROMER II
TECHNOMATIC LTD.

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Data input from keyboard/Tape/Disc/Eprom.
- Software interface for integration of user's special requirements.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.
- Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc £99 (b)
ROM based software £10

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59 (b)

UV1B as above but without the timer. £47 (b)

MERLIN

NEW

A new advanced disc-users utility.

This 16K rom-based utility is one of the most comprehensive packages offering many unique features. Its over 50 commands are all fully tube compatible. It is supported by a 100 page manual. This package is aimed primarily at disc users with the BBC B and the B plus. (Master version available soon).

Major Features:

DISC UTILITIES including:
Disc editor, with search, verify and repair utilities. Clone utility, backup/edit of protected discs. A special formatter to speed up disc accesses. Tape archive of discs and tape/disc transfer utilities. Screen compaction. Vastly improved copy and backup facilities.

MACHINE CODE UTILITIES including:
Memory search and edit, disassembly with 65C02 codes supported, switching between roms, main memory and tube, examine fx and osbyte calls.

MERLIN with 100 page manual £37.50 (b)

Send for the detailed command listing.

REAL-TIME CLOCK CALENDER

time-wasp
real-time clock

A low cost-unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £29 (d)

ROM/RAM EXPANSION SYSTEMS

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sidewaysd rom expansion to 16 ROMs. One socket has been split into two 87K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £37 (d) Battery Backup Kit £18 (d)

ATPL Board for BBC Plus 10 × 16K ROMs £29 (d)

COMPUTER VILLAGE CV-16 Rom Board £38 (d)

A neatly designed, simple to instal board allows full sideways rom expansion on the model B. Two sockets for 8K CMOS RAM allow a total of 16K for which battery back is fitted as standard. £35 (d)

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £79 (b)

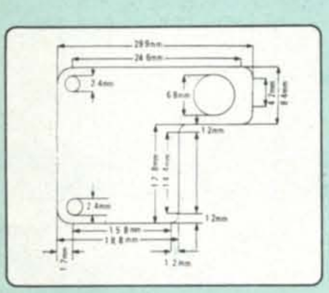
(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

NOVACAD
Computer Aided Draughting for the BBC Micro

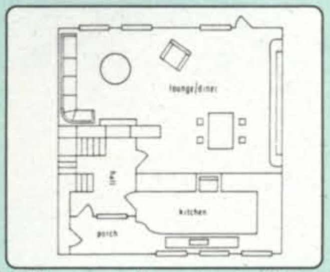
A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive NOVACAD's capabilities are further enhanced.



- * Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
- * Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
- * ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
- * Shapes can be copied on the screen as many times as required.
- * The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
- * Horizontal and vertical displacements can be measured in any user defined scale.
- * Any two colour can be used in mode 4.
- * Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- * Text can be added at any position vertically or horizontally.
- * Use of 2nd processor will allow use of any 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
- * Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
- * Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- * An optional plotter utility contains a plotter configuration program allowing the user to configure a program for his plotter. Pre-configured programs are included for Epson HI80, Hitachi 672, Penman, Plotmate and·HP GL.



NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c).

Novacd compatible with Tracker Ball/AMX Mouse £99 (c)

Stand Alone Mouse for use with NOVACAD £34 (d)

Upgrading of existing ROMs and DISCS £20 (d)

Plotter Utility Program £28.50 (d)

NEW META VERSION THREE

Now Available

- * **Assembles for even more processors**
- * **Now over 70k long on 2 Roms and 2 Discs**
- * **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It comes on two Roms and two Discs for your BBC or BBC+ and a single rom with disc for the Master and gives you complete Editing and Assembly facilities for all the listed processors:

1802
HD 64180
Z80
6502 (including *all* CMOS varients)
65C812
65C816
6800
6802
68HC11
68000
8048 Series
8051 Series
8080
8085
Z8
68120
68121
6808
6301
6303
6305
6801
6803
6805
6804
6809

META uses the appropriate standard mnemonics for each, eg. LD (HL) 0ABH in Z80 and MOVE. B DO, $S0 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MIL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your detailed spec sheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon. **£145 (c)**

Please specify the computer type when ordering.

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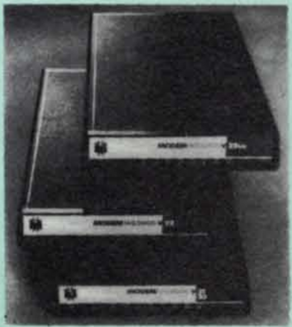
(b) £2.50
(c) £1.50
(d) £1.00

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.



WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. £295 (b)

WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. £495 (b)

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. £650 (b)

BBC Data Cable for WS3000 £6 (d) Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £102 (c)** Data Cable £7.

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30 (d).
BBC User Port cable (for modem control) £4 (d)

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SKI KIT (Allowing total control of the modem by your computer) £10 (d)

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling £10 (d)

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. SPECIAL OFFER £75 (b)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. £24 (d)

COMMUNICATIONS SOFTWARE

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc £16.50 (d)

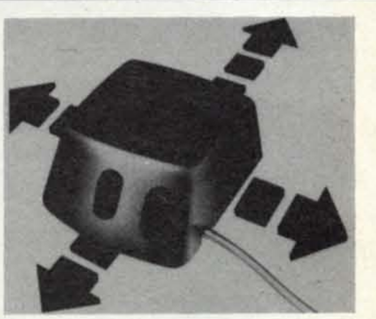
TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. £25 (d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £49 (d)
RS232 Solution (Book) £15.95 (c)

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. £28 (d)

RS232 SolutionBook £17.95 (c)

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art £67 (d)

AMX Super Art Package on its own £43 (d)

AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. £43 (d)

AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. £21 (d)

AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. £21 (d)

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-21 (with 'icon artmaster'). £59 (c)

BBC COMPUTER SPARE PARTS

Complete Keyboard	£52	UPD7002	£5.00
Power Supply Unit	£52	DS3691	£3.50
Keyswitch	£1.75	7438	£0.40
Keyboard Connector	£4.00	74LSOO	£0.24
Video ULA	£18.00	74LSO4	£0.24
Serial ULA	£14.00	74LS10	£0.24
UHF Modulator	£4.50	74LS123	£0.80
6502A 2MHz CPU	£6.50	74LS163	£0.75
65C02 CMOS CPU	£12.00	74LS244	£0.80
6512AP CPU	£12	74LS245	£1.10
6522 VIA	£3.50	74LS373	£0.90
6522A 2MHz VIA	£5.50	74LS393	£1.00
LM3 24 op-amp	£0.45	8271	£46
SAA 5050-Teletext	£9.00	88LS120	£3.00
6845SP CRT Controller	£6.50	4464 RAM	£8.00
		O/S Basic B +	£25

All the above carry Carriage Code (d)

TECHNOMATIC

FIRMWARE AND SOFTWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £39 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. £49 (d)

MASTERFILE II The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW £17.00 (d) Disc (80 or 40T).

GEMINI'S DATAGEM £59 (c)

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. £39 (c)

VIEW VERSION V3.O Also compatible with BBC + Complete with Printer Driver Generator. £60 (c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £36 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £10 (d)

VIEW PRINTER DRIVER GENERATOR: This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. £8 (d)

VIEWSPELL: A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. £52 (d)

WORDWISE £28 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £45 (d)

WORDEASE A rom based utility for the Wordwise plus. £24.50 (d)

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. £31 (d)

EDWORD II £43 (a)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £39 (d)

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. £25 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £45 (c)

INTERCHART Graphics Package for the Intersheet. £30 (d)

ULTRACALC £49 (d) **QUICKCALC** £14.50 (d)

LANGUAGES

META-ASSEMBLER: For full details please see page 6 of this advertisement.

Meta-Assembler £145 (c)

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. £259 (b)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £39 (d)

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £62 (c)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £48 (a)

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. £28 (d)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £49 (b)

LOGOTRON logo £56 (c)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £46 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (d)

BCPL STAND ALONE GENERATOR £39 (d)

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **Disc** £49 (c)

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) £35 (c)

UTILITIES

ACCELERATOR	£49 (d)	**ACORN BASIC EDITOR**	£24 (d)
BROM	£28 (d)	**SLEUTH**	£24 (d)
TOOLKIT plus	£31 (d)	**EXMON-II**	£22 (d)
HELP II	£27 (d)	**DISC DOCTOR**	£26 (d)
DISCMASTER	£18 (d)		
ACORN GRAPHICS ROM GXR.	£23 (d) (specify BBC B or BBC B PLUS)		
COMPUTER CONCEPTS GRAPHICS ROM	£22 (d)		
PRINTMASTER	£26 (d)		
DUMPMASTER II 16K rom with dump routines and a variety of features for about 40 different printers.	£26 (d)		
FONTWISE	£10 (d)		
HERSHEY CHARACTER FONT GENERATOR	£18 (d)		
ICON MASTER	£29 (d)	**STAND ALONE MOUSE**	£34 (d)
BILLBOARD	£18 (d)	**STUDIO EIGHT**	£19 (d)
ACORN'S CREATIVE SOUND	£15 (c)	**CC SPEECH ROM**	£28 (c)
ACORN'S SPEECH PROCESSOR ROM	£15 (d)	**ROMIT**	£29 (d)
PROGRAM BUILDER	£18 (d)	**REPLICA III**	£12 (d)
DATABEEB	£24 (d)	**COMMUNICATOR**	£49 (d)
COMMSTAR	£26 (d)	**TERMULATOR**	£25 (d)

When ordering software on disc please specify track format (40/80)

BOOKS

No VAT on books; Carriage (c)

LANGUAGES:	
6502 Assy Lang Prog	£19.95
6502 Programming	£16.95
8086 Book	£23.95
Acorn BCPL User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
S-PASCAL	£7.50
Acorn ISO Pascal Ref Manual	£12.50
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£12.50
Creative Sound	£7.50
Introduction to Pascal	£16.50
Prog the Micro with Pascal	£8.50
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45
BBC MICRO BOOKS FOR BEGINNERS:	
BBC User Guide Acorn	£15.00
BBC PLUS User Guide	£15.00
Drawing your Own BBC Programs	£6.95
Introducing the BBC Micro	£4.50
Mathematical Programs in BBC Basic	
PROGRAMMING/UTILITY	
Advanced User Guide	£12.50
Adv BASIC Rom User Guide	£7.50
Advanced Prog Tech for BBC	£8.95
Applied Ass./Lang on the BBC	£9.95
BBC Micro Advanced Programming	£9.95
BBC Micro Sideways ROM's RAM's	£9.95
BBC Micro Sideways Roms B. Smith	£9.95
Guide to the BBC ROM	£9.95
Exploiting BBC BASIC	£6.95
Further Programming for BBC	£4.00
Programming the BBC	£6.50
Structured Programming	£6.50
Using BBC BASIC	£10.00
View 3.0 User Guide	£12.50
Viewstore	£12.50
Viewsheet	£12.50
Word Processing on BBC (Wordwise + Epson)	£5.25
SOUND & GRAPHICS:	
Advanced Graphics with BBC	£6.00
BBC Graphics & Sound	£7.50
Creative Sound on the BBC	£9.95
Graphics on the BBC Micro	£6.00
DISC DRIVE SYSTEMS:	
Advanced Disc User Guide	£14.95
BBC Micro Disc Companion	£7.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
APPLICATIONS:	
BBC Filing Systems & Databases	£7.95
Business Programming on BBC	£7.95
Business Applications on BBC	£7.95
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EDUCATIONAL SOFTWARE

We are pleased to announce that we now stock the full range of BBC Publications Educational software for the BBC computers. This software which is in many cases developed alongside radio and TV programs from the BBC Education Department, has all been tested in many schools, and by education experts to ensure the high quality one would normally expect from BBC. These packages supplement the class room learning by providing moving and colourful graphical displays which normally cannot be easily produced on the blackboard and help in ensuring clear understanding of a variety of subjects. The software has received wide acclaim from teachers, and in the educational press. All cassette programs transfer easily to disc, and all disc programs can be run on 40 or 80 track drives.

PRIMARY LEARNING

ASTRONOMY
Aimed at the 9-12 age group, programs include Phases of the Moon, Eclipses, Seasons of the Year, Planetary Motions and Lander which is a gravitationally accurate game. All programs feature colour graphics ▣ **£12 (d)**

COMPUTERS AT WORK: THE WORK GAME
Uses the technique of computer synchronised audio to illuminate two of the most important applications of computers — robotics and information technology. Includes a complete database program, tutorial on word processing principles, and robot control program driven by a logo-type language.
▣ **EC £13 (d)**
↷ ▣ **EC £17 (c)**

DRAWSTICK
For children aged 8 upwards allowing them to create pictures, charts, maps and diagrams. It is sufficiently sophisticated for use by older children and adults. Pictures are saved in a compressed form, and can be incorporated in your own programs. Uses keyboard or joystick.
▣ **£9 (d)**

INTRODUCING GEOGRAPHY
Four exciting graphic adventure simulations to bring geography to life for the 9-13 age group. River involves navigating a river's course to the sea. In Flight, you fly an aircraft round the world. Summit takes you up Mount Everest, and Nomad involves survival in the desert.
▣ **£17.20 (d)**

MATHS WITH A STORY 1
Four primary-level maths programs suitable for children of a wide range of abilities. Topics include symmetry, co-ordinates, and probability.
£9.50 (d)

MATHS WITH A STORY 2
These further four maths programs are for the same age/ability range as pack 1, and cover similar topics, from different angles. **£9.50 (d)**

NUMBER GAMES
Six maths programs designed to please the eye and stimulate the mind of any active and adventurous child aged 8 upwards.
EC £8.65 (d)

USING YOUR COMPUTER
A friendly and original introduction to computers using the computer synchronised audio technique. Written for a 8-12 year old but also suitable for any complete novice. Total of 80 minutes of audio material and 14 programs.
£26.00 (c)

WORD PLAY
An elegant but simple program to introduce primary school age children to the concept of word processing. Search, delete, justify etc have small animal icons associated with them. Fun manual for small children. **£10.75 (d)**

DRAWSTICK **£8.50 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
Six programs covering the central concepts and principles of statistics. Topics covered are Discrete Data and Binomial Distribution, Continuous Data and the Normal Distribution, Hypothesis testing and confidence intervals, Central Limit theorem and Estimation, Simulations, Correlation and regression.
▣ **£25 (d)**

ADVANCED STUDIES: GEOGRAPHY
Four programs examining aspects of social geography — traffic and town planning, drainage basin management and planning for industry. Users can alter the models. Details in the comprehensive manual.
▣ **£11 (d)**

INSIDE INFORMATION
Designed to provide a basic introduciton to information technology for young people and adults. The course assumes no prior knowledge of the subject and is suitable for use in secondary schools, further education colleges, ITeCs and adult education centre. This software can be used alone, or in conjunction with the BBC's Inside Information radio series.
▣ **EC £11 (d)**

OPEN LOGO
Developed by the Open University to provide a full implementation of Logo — the language of learning — for the BBC Micro. 2 × 16K ROMS and two detailed manuals (120pp and 300pp)
▣ **EC £61 (c)**

SCIENCE TOPICS: WAVES
A secondary level physics program allowing the student to learn about waves by displaying waveforms on screen. Parameters can be altered and the results observed immediately.
▣ **£15 (d)**

SCIENCE TOPICS: RELATIONSHIPS
A secondary level biology program giving a sophisticated simulation exercise for students, based on data from the World Health Organisation. You are malaria control officer for an African village, and you must use the right combination of drugs, pesticide and education to combat the disease.
▣ **£15 (d)**

SCIENCE TOPICS: BONDING
A secondary level chemistry program designed to reinforce and strengthen students' concept of the bonding of elements. Transfer and sharing of electrons are both shown graphically.
▣ **£15 (d)**

SCIENCE TOPICS: ELECTROMAGNETIC SPECTRUM
A secondary level graphical adventure designed to test your knowledge of the electromagnetic spectrum. You are lost in space, and you must build a radio, perform spectroscopic analysis etc. to complete the adventure. ▣ **£15 (d)**

SCIENCE TOPICS: ELECTRONICS IN ACTION
A secondary level program about using computers for control. The pack gives three simulations of control systems. Control is achieved using a subset of 6502 assembly language. A program editor is supplied.
▣ **£15 (d)**

SCIENCE TOPICS: NEWTON AND THE SHUTTLE
This secondary level interactive program in three parts follows the space shuttle from launch to recapture of a satellite in space. Students knowledge of Newtonian mechanics is tested at each stage.
▣ **£20 (d)**

SCIENCE TOPICS: ECOLOGY
This program allows students to take the part of groups who manage a nature reserve according to their own special interests. The object is to keep all groups satisfied.
EC £20 (d)

SCIENCE TOPICS: POLYMERS
Students run a manufacturing company and must make decisions as to the best materials to use for their products. They compete with a computer run rival company. Two areas of manufacturing are featured — car parts and kitchen equipment. **EC £20 (d)**

SECONDARY SCIENCE: MICROTECHNOLOGY
This software for the 14-16 age group will help students understand certain fundamental concepts in basic electronics. The pack contains Logic and Resistor Tutors, a Servo circuit simulation and a Circuit Design program.
£7

SECONDARY SCIENCE: THE MOLE CONCEPT
A computer synchronised audio program which explains definitions of atomic and molecular masses and attractively depicts molar equations. The audio track is written and presented by Fred Harris.
↷ ▣ **EC £17 (c)** ▣ **EC £13 (d)**

SECONDARY SCIENCE: UNIFORMLY ACCELERATED MOTION
A physics program which illustrates basic equations, uniform acceleration under gravity and the idea of terminal velocity. The medium is computer synchronised audio.
↷ ▣ **EC £ 17 (c)** ▣ **EC £13 (d)**

VU-TYPE
The popular 'sight and sound' touch-typing tutor using colour graphics. The layout and parameters can be altered. 23 exercises can be loaded from disc.
▣ **EC £16 (d)**

GENERAL

GAME CORE
This software gives you all the information and intelligence routines you need to write simple and highly absorbing board games for your computer.
£9 (d)

MONITOR
A professional tool for mahcine-code programmers, suitable for assembly language experts and beginners alike. It is also ideal for teaching assembly language.
EC £34 (d)

TOOLBOX 2
25 programming aids for the BBC Model B. Book (essential) sold separately. Program include machine code monitor, disassembler, fast flood fill, sprite generator/mover, and many more. **£9 (d)**

ULTRACALC 2
An electronic spreadsheet program with all the necessary built-in features. Ideal for business and personal management. **£52 (d)**

VU-TYPE PROFESSIONAL
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Icon front end for the BBC Micro

Product: Icon Master
Price: £34 (ROM)
Supplier: Beebugsoft, PO Box 109, High Wycombe, Bucks. HP10 8NP. Tel: 049481 6666

THE **Icon Master** package from Beebugsoft contains a manual and a 16k ROM which has all the necessary software to create an icon-based front end resembling the Gem and Macintosh interfaces. The whole package has been designed with the AMX Mouse in mind, although it works well just using cursor keys.

After installation all you need to do is call the ROM in the usual way – *ICONM. All abbreviations are supported and the Entry command can be prefaced by B to avoid clashes with other ROMs.

The first of Icon Master's three utilities, the icon designer (see Figure I), enables you to load, save and edit pictorial icons. They can be created from scratch, although most of you will prefer to alter pre-existing ones.

Three sets of icons are available on the Icon Master ROM, and, as the icons are AMX compatible, AMX icons can also be used or edited.

You edit by moving the relevant icon into the large square on the left, placing the cursor over a pixel, and pressing f1 or f2 to toggle the pixel.

Above the Icon Master logo are two windows. The left hand one shows the current icon in the size in which it will be used. The longer right hand window contains a number of icons representing facilities used to alter the icon being edited. They will transpose the icon and its background, move the icon one row of pixels left, right, up or down, and rotate the icon.

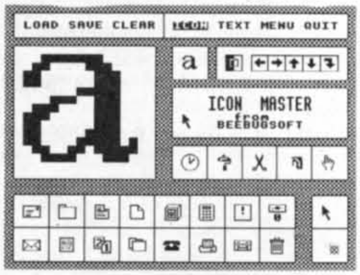


Figure I: The icon designer

Underneath the logo are five icon spaces which will retain their contents if another icon set is loaded. Bottom left sees the 16 icons making up a set, while in the two bottom right squares are the icon for the cursor and that for the background – both alterable.

Once created, a set can be saved or you can move on to the next utility, the text editor (Figure II).

This allows you to create textual icons by placing the cursor over the relevant text icon in the large box, pressing f0 and entering text followed by Return. Once again icons, both text and graphic together, can be saved.

The third option is the menu designer (Figure III). The screen displays the currently selected graphic and text icons and allows you to design your own menu screen.

Above the logo are five icons. The first switches in a grid on the user menu screen which is helpful in lining things up. The middle icon allows the creation of windows in the user screen. These may be overlaid and can be open (always displayed) or closed (only displayed when called).

Once all the windows are set you select the icon you wish to place and the software shows you the user screen so that you can place it.

Editing icon position is achieved by selecting the display icon, second from the left above the logo and editing the user screen. Foreground and background colours are selected using the two remaining icons above the logo.

One example menu screen is available on the chip.

You then select the numbers icon, just underneath the logo, and the number of each graphic and text icon is displayed, followed by a display of the window numbers. Here you need to write down the numbers so that you can use them in your program. Finally you must save your screen.

Quitting the Icon Master places a number of procedures into memory which are needed to support an icon menu-driven front end. You then have to write a short Basic program to interface between the menu screen and the remainder of your programming.

This is where the manual supplied with the package is at its poorest. Although the explanations of how to write your linking programs are reasonably clear – the examples given do not work with the on-chip example screen.

It took me some time to work my way through each of the programs to find the faults, which surprised me in that they were not simple printing errors.

The result of rewriting the last one, which supports an on-screen calculator, is seen in Figure IV. In each case it looks as though the examples have been written with another example screen in mind.

Has Beebugsoft fallen foul of upgrading the chip and not the manual?

Icon Master is a useful, if somewhat complex, package for those wishing to run their BBC Micro in a manner similar to Gem or Macintosh. However I hope Beebugsoft will correct the painful errors in the examples contained in the manual.

Ian Whitmore

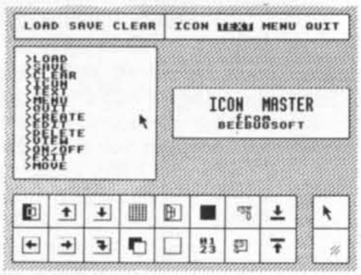


Figure II: The text editor

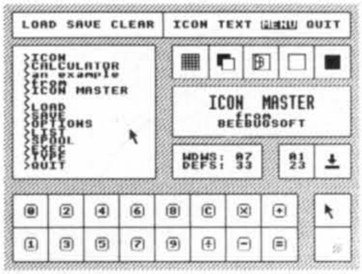


Figure III: The menu designer

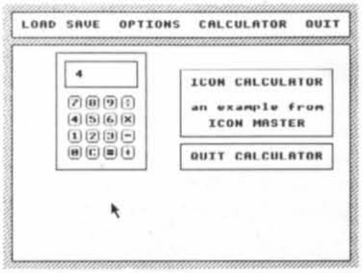


Figure IV: The calculator

Mega ROM covers a multitude of micro chores

Product: Mega ROM
Price: £34.95
Supplier: Chalice Software, 3 Merlin Way, Covingham, Swindon SN3 5AN. Tel: 0793 615026

THIS is definitely *the* Jack of all trades toolkit ROM for the BBC Micro. Packed into one 16k eprom are no less that 68 commands for ROM management, memory management, file handling, and aids to Basic programming.

If you do not already have these facilities, or if only one sideways ROM slot is spare in your micro, then I would not hesitate to buy Mega Rom.

However, as you might expect with a utility that tries to do everything, some sacrifices have to be made in implementation and display quality. I will try to concentrate on features which are either better, new, or poorer than those covered in my previous toolkit reviews for *The Micro User*.

They were: *Addcomm, Aids II, Caretaker, Molitool, Toolkit, Toolstar, October 1984; Rom Manager, June 1985; Brom, August 1985; Basic Extensions, September 1985; Slave, October 1985; The Basic Editor, November 1985; Beebman, January 1986*.

Mega Rom comes with a 23 page A5 manual printed on a dot matrix printer but well produced on glossy paper.

It just about suffices in explaining each command, but could be improved with more details of certain features like the SCRAMBLE and TDISK options.

The ROM itself can be placed in any sideways socket, although a high priority is preferred. The version reviewed was 1.00 and occupied all 16k of the ROM.

PAGE was not altered, no screen signature was produced, and the software has a service entry address but no language entry or tube relocation.

In general it did not interfere with and was not upset by numerous other ROMs tested alongside. Mega Rom worked satisfactorily in the BBC B with DNFS, the BBC B+, and the BBC Master 128.

On typing *HELP the four sections are revealed:

ROM	ROM management
OPER	System memory manipulation
FILE	Additional filing system commands
BASIC	Basic programming aids

Each header displays its commands upon keying, for example *HELP ROM.

ROM commands: These offer an excellent set of facilities for switching on or off selected, or groups of sideways ROMs and for manipulating sideways RAM. Switched off ROMs really do remain switched off even after Ctrl + Break unlike some other ROM managing utilities.

Like the rest of Mega Rom command parameters may be given in decimal, hex, binary, or as strings where appropriate. Unfortunately no prefix letter is available on Mega Rom and certain clashes are inevitable.

***SOCKET** lists the ROMs switched on by socket, name, copyright and length. This also indicates deselected sockets.

***RSAVE** saves a specified ROM image to file.

***RLOAD** loads a ROM on file to sideways RAM and automatically deselects resident ROMs of the same name.

***ROFF** turns off specified ROMs. Multiple entries can be made on one line of the command.

```
    Socket number:  5
        Rom title:  MEGA ROM
   Binary version:  0 %00000000
   Version string:  1.00
 Copyright string:  (C) 1985 Chalice
           Length:  16k
    Service entry:  &8029
   Language entry:  No language entry
  Tube relocation:  No tube address
```

*Figure I: Output of *STATUS command*

***KEEP** turns off all ROMs except Basic, DFS, and Mega Rom plus any specified in the command parameters. This is time saving and helps avoid clashes between ROMs and autoboot files.

***RON** turns on all or specified previously deselected ROMs.

***STATUS** gives very detailed information about all sideways ROMs present in the computer (see Figure I).

***SEND** directs a command to a specified ROM to avoid interception by similar commands from higher priority ROMs.

OPER commands: These are a fairly extensive set of utilities for examining and editing RAM and ROM memory including the function key areas.

***MDIS** disassembles memory in RAM or any selected ROM area. The output is rather uninspiring compared with dedicated machine code monitors and is limited to black and white in any screen mode and has no print out option. Scrolling, however, can be forward, backward or paged and is very fast indeed.

***SDIS** is a useful feature in which memory may be diassembled into assembly mnemonic format direct to file ready for EXECing into a Basic program.

***MEDIT** is a limited RAM memory editor.

***SFIND** searches memory and lists the

```
USER     200  E310         BRK      202  B402
IRQ1     204  DC93         IRQ2     206  DE89
OSCLI    208  DF89         OSBYTE   20A  E772
OSWORD   20C  E7EB         OSWRCH   20E  E0A4
OSDRCH   210  DEC5         OSFILE   212  B5E2  0
OSARGS   214  B033  0      OSBGET   216  B12C  0
OSBPUT   218  B218  0      OSGBPB   21A  B626  0
OSFIND   21C  AEAE 0       FSCV     21E  B613  0
EVNTV    220  FFA6         UPTV     222  FFA6
NETV     224  FFA6         VDUV     226  FFA6
KEYV     228  EF02         INSV     22A  E4B3
REMV     22C  E464         CNPV     22E  E1D1
IND1V    230  FFA6         IND2V    232  8000
UND3V    234  FF0E
```

*Figure II: Output of *XVECTORS command*

locations of all occurrences of a specified string.

***BFIND** is similar to SFIND but can locate specified bytes.

***MSHIFT** is used for intelligent shifting of blocks of memory.

***MSWAP** swaps a block of memory between two locations.

***MFILL** fills a selected area of memory with zeros or a specified byte.

***NROM** specifies the sideways ROM to be acted upon by default with other commands.

***KLIST** is a full function key display and edit facility.

***KLOAD** loads pre-set function key definitions from file.

***KSAVE** saves defined function keys to file.

***XVECTORS** is a unique feature which displays the name, address and contents of the BBC Micro vectors (see Figure II).

***BASE** displays an entered value in binary, hexadecimal and decimal notation.

***CRC** gives a cyclic redundancy check value for an area of memory in order to check for alterations to the code.

***VIDEO** converts the screen colours in Modes 0 to 6. This is useful for improving the clarity of presentation in detailed spreadsheets and word processors on many monitors and TV displays.

***PC** is used to output a string of bytes to a printer, usually for control purposes, without having to enter endless VDU1 codes.

***GO** is similar to CALL in Basic but can be used from other languages.

***CHARDEF** displays the binary, hexadecimal and decimal codes used to construct a character. It is a pity there was no option for character editing.

***BREAK** resets and clears all RAM memory.

FILE commands: These provide an extended set of filing commands of particular use to disc users. They are great for checking and editing disc memory but are mainly limited to the normal single density format.

***CLOSE** is equivalent to CLOSE#0 which closes all open files.

***SCRAMBLE** encrypts a file so that it may only be loaded or read via a password. This is a unique and excellent security device even against most people who have disc sector editors. It worked perfectly every time – so don't forget your passwords.

***UNSCRAMBLE** de-encrypts a scrambled file on entering the password so that it may be read and loaded.

***FREE** displays the number of files, gaps and free space on a disc.

***FORMAT** is a fast disc formatter which unfortunately is limited by only being able to deal with one disc surface at once.

***VERIFY** is a fast disc verify routine with the same limitations as the formatter.

***SECTLOAD** loads a specified disc sector to memory.

***SECTSAVE** saves memory to a named disc sector.

***FSFIND** searches a disc or selected part of a disc for all occurrences of a specified string.

***FBFIND** is similar to FSFIND but locates specified bytes.

***EDSECT** is a simple disc sector editor, limited by the lack of ability to jump tracks.

***REPAIR** attempts to repair a bad track and rewrite the data back to it.

***MRELOC** allows a file with a load address below &1900 to be loaded and then relocated without corruption from the DFS.

***ALTER** is used to alter the load and execution address of a file on disc.

***CHECK** compares two files and notes the location of any differences.

***TDISK** enters Chalice's file transfer utility. This is a menu driven screen used to load, save, rename, lock, and input or output files to and between different filing system such as Tape300, Tape1200, Disc, ADFS, NET and ROM.

Though it worked well except for the odd minor clash with other ROMs its display was poor in not showing the names of loaded or renamed files during use.

***SCOMP** is placed near the beginning of a graphics routine in a Basic program, for example before DRAW and PLOT commands – this allows the graphic screen to be filed to disc as it is drawn.

The program may then be extensively shortened and the plotting routines replaced by a single command which loads the screen from file as if it were being drawn. This is much more dynamic than a simple screen save facility and worked well with many of the Acornsoft Creative Graphics routines.

***ECOMP** is the instruction put at the end of the routine preceded by SCOMP.

***RCOMP** replaces the plot routines and calls the screen back from file.

BASIC commands: These are a typical and fairly comprehensive set of programming aids for editing Basic programs.

***BAD** repairs a corrupted program – though not always successfully.

***XLIST** removes control characters which make an unlistable program readable.

***SEARCH** searches a Basic program for keywords, strings, numerics, and symbols. This worked well, though as expected did not resort to fancy screen displays.

***SREPLACE** is a selected replace routine for strings, numerics and so on.

→

PROBLEM

I HAVE a Series 3 BBC B fitted with Wordwise Plus and a 32k Solidisk Sideways RAM board. As I use the machine chiefly as a word processor, I have been wondering whether there is any way that I could use the Sideways RAM as a shadow RAM, in order to be able to preview Wordwise in 80 column mode.

Having been an electronics technician for over 40 years, I'm quite prepared to make mods to the circuitry, but being comparatively new to computers, I don't yet know what is involved in such a modification. – D.W. Pickering, Preston.

SOLVED

Whilst it is not impossible to convert sideways RAM into shadow RAM it is just not economic. What you have to do is to totally re-arrange the computer's memory map.

This involves cutting some address lines and directing them into your own logic. You then have to write a software ROM that will intercept all screen access calls and switch your shadow RAM out and then back on again when the screen access has been completed. As time is money it would take a great deal of time and you are better off buying the Aries B32, as they have done it all for you.

From Page 47

***GREPLACE** is a global replace routine where all occurrences of the specified item are changed.
***SNIP** is an ultra fast version of 'delete to end of program'.
***APPEND** adds a Basic program to the end of one in memory. The longer program then has to be renumbered in the usual way.
***XENVELOPE** displays all ENVELOPE definitions.
***MEMORY** gives information on RAM memory usage by a Basic program (See Figure III). This was unfortunately limited to hexadecimal output only.
***FLUSH** zeroes the resident integer variables.
***SHRINK** removes REMs and spaces and joins multi-statement lines in an intelligent fashion in order to save on memory usage.
***BEXPAND** separates multi-statement lines intelligently, taking care of statements following IF ... THEN.
***LVAR** lists the contents of all active variables except arrays.
***NUMBER** is a fast and intelligent partial renumber routine.
***MLINES** moves a block of lines within a program.
***CLINES** copies a block of lines to another part of a program.
***BMOVE** moves a program and resets PAGE and TOP as specified.
***BCHECK** verifies a program in memory against one on file.
***FLIST** produces a neat indented listing with split multi-statement lines on screen or printer.
***XON** invokes an improved error handling routine which replaces ON ERROR and displays the offending line and error message at the top of a blank screen.
***XOFF** resets XON to normal.

Mega Rom has a comprehensive set of utilities which should suit almost every BBC Micro user. I was particularly impressed by the ROM managing features, disc security option and the graphics saving function.

```
OSHWM    &1900
PAGE     &1900
TOP      &2653
LOMEM    &2653
HIMEM    &7C00
First free location &2653
Memory free &55AD
Variable space &0
Program size &D53
```

*Figure III: Output of *MEMORY command*

Inevitably a few commands were rather poor in their output display compared to dedicated toolkits concentrating on either Basic, machine code or disc features but this did not destroy their usefulness.

Probably the major feature missing is a full screen editor so that this chip alongside Acornsoft's Basic Editor would be a good combination.

Overall a good selection of numerous utilities and a recommended buy at around £35.

Chalice also produce two chips containing subsets of the Mega Rom commands. The first is Scythe which employs 26 utilities mixed between the OPER, FILE and ROM sections with additions like *SLOW.

This package includes their Vector tape to disc transfer utility on disc. Also available is ROM Master which has 20 utilities for ROM management, memory editing, function key editing and the disc security system of Mega Rom.

Mike Mahon

Handy when you're moving by Tube

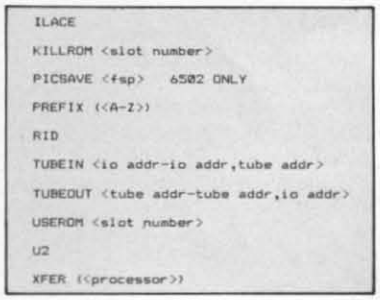
Product: U2 Second Processor Utility ROM
Price: £32.20
Supplier: Kent Micro Computers, 57 Union Street, Maidstone, Kent. Tel: 0622 52784

MANY ROMs now on the market have been written to take advantage of the extra speed and memory of the second processors, but few have been written just for the Tube.

Acorn already provides some routines to communicate between the original BBC Micro, the input/output or IO processor and the second processor, but it is difficult to get any official documentation.

There is also a need for extra calls to make the system easier to use. The U2 commands and their syntax are displayed with *HELP TUBE (see Figure I). They have been designed for both the 6502 and the Z80 second processors.

***BUFFER** uses the spare space in the IO processor as a printer buffer. The amount of memory available depends on the screen mode and ranges from 25344 bytes with Mode 7 to 5888 bytes with Mode 0.
***CALL** is an easy way of getting around the problem of calling machine code in the IO processor from the second processor.
***ILACE** turns the interlace off in Mode 7, which stops the screen jittering on some monitors.
***PICSAVE** saves the screen to disc or tape and will only work with the 6502 second processor.
***PREFIX** allows you to choose an optional letter to prefix any of the U2 commands, to help prevent any clash of command names with any other ROM in the BBC Micro.



```
ILACE

KILLROM <slot number>

PICSAVE <fsp>   6502 ONLY

PREFIX (<A-Z>)

RID

TUBEIN <io addr-io addr,tube addr>

TUBEOUT <tube addr-tube addr,io addr>

USEROM <slot number>

U2

XFER (<processor>)
```

*Figure I: Output of *HELP TUBE*

***TUBEIN** and ***TUBEOUT** transfer memory between the second processor and the IO processor.
***RID** displays the ROMs present in the machine and whether they are active or inactive.
***KILLROM** and ***USEROM** are used to disable or re-enable a ROM. The disable function is only effective through a Break, not a Ctrl+Break.
***U2** simply displays a copyright notice.
***XFER** sets the speed at which *TUBEIN and *TUBEOUT work, as these are different for the two processors.

This simple but effective set of utilities simplifies two of the main problems faced by Tube programmers, that of transferring data between the two memories and calling machine code in the IO processor. I know some people will get this ROM just for the *BUFFER command.

Jim Notman

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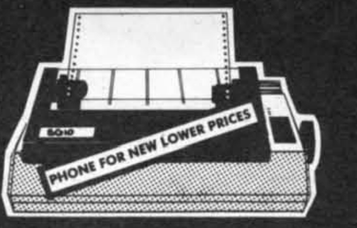
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BEEBUG SOFT

Taking STEPs to explore loops

Part 6 of PETE BIBBY's series for the micro novice

FOR the next few paragraphs we'll be taking a look at FOR ... NEXT loops. These are the Basic commands that allow a program to double back on itself, doing the same thing over and over. This magnificently inconsequential Program I should refresh your memory:

```
   10 REM Program I
   20 FOR cycle=1 TO 5
   30 PRINT "Cycle number ";cycle
   40 NEXT cycle
   50 PRINT "The loop has ended"
   60 PRINT "The variable cycle now h
as the value ";cycle
```

Program I

Once the BBC Micro comes across a FOR it knows that lurking somewhere later in the listing there'll be a NEXT corresponding to this FOR. More than that, it knows that the program lines wedged between the two are to be repeated.

In the case of Program I lines 20 and 40 mark out the loop and the solitary line 30 is the bit that gets repeated. But how does the micro know how many times the body of the loop is to be performed?

The answer lies in the loop control variable. This grandly named creature is just a normal numeric variable which is set to an initial value and increased by one each time round the loop. Should it exceed a final value the loop stops.

In this case the loop control variable is *cycle*. Line 20 tells the computer that as *cycle* varies from 1 TO 5 the body of the loop – line 30 – is to be performed. Once *cycle* exceeds 5 the loop stops. This leaves *cycle* with the value 6 as line 60 shows.

Once you've grasped the fact that the loop control variable automatically goes up by one each time round the loop there's a lot you can do with it. Take a look at Program II. Do you remember doing your times table at school? Well this program will print out the first 12 answers of any times table that you care for. Try it and see.

```
   10 REM Program II
   20 PRINT "Which times table do you
want";
   30 INPUT number
   40 CLS
   50 FOR loop=1 TO 12
   60 PRINT loop" times ";number;" is
";loop*number
   70 NEXT loop
```

Program II

Line 20 prompts the user for a number. It's good practice to have a prompt on the screen rather than an annoyingly unspecific question mark. Line 30 collects the answer and stores it in *number*. To make room for our table line 40 uses CLS to clear the display. At line 50 the program enters the loop.

From here you should be able to see that the loop will cycle 12 times as the control variable *loop* takes values from 1 to 12.

Line 60 is the bit that does the work, multiplying *number* and *loop* to give the required answer.

Note that *number* is the same each time, but *loop* varies from 1 to 12. The result is the times table. Try to guess what the final values of *number* and *loop* will be and check your answer with:

```
80 PRINT loop, number
```

Notice the power of the FOR ... NEXT loop. Only three lines of code doing all that work, and it would be simple to change line 50 to :

```
50 FOR loop=1 TO 100
```

or:

```
FOR loop=1 TO 1000
```

Try altering the program so that it not only allows the user to give a value to *number* but also to set the maximum limit of the loop control variable.

Even with such simple FOR ... NEXT loops as these you can do some relatively sophisticated maths – well for me relatively sophisticated. You'll probably remember that a number multiplied by itself a certain number of times is said to be raised to a power, so 2 to the power 2 is 2*2, 2 to the power 3 is 2*2*2 and so on.

Program III shows how powerfully loops can deal with powers. It should come as no surprise – after all it's just multiplying a number by itself over and over again. And repetitive tasks like that are what computers and program loops are good at.

```
  10 REM Program III
  20 PRINT "What is the number";
  30 INPUT base
  40 PRINT "To what power";
  50 INPUT power
  60 total=1
  70 FOR loop=1 TO power
  80 total=total*base
  90 NEXT loop
 100 PRINT total
```

Program III

The first lines are just used to gather information from the user. The number that is to be multiplied by itself is stored in *base*. The number of times that it is to be multiplied is held in *power*. The running product is stored in *total* which is initially set to 1. Then the program enters the FOR ... NEXT loop of lines 70 to 100.

This has control variable *loop* which will take values from 1 to *power*. In other words the loop will cycle *power* times. Each time round the loop *total*, originally set to 1, is multiplied by *base*. Once this has been done *power* times the

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From Page 51

program drops out of the loop and the final line gives the answer.

Try messing around with the program, varying the values you give it to work on. And don't be too worried if you get some strange looking numbers as the micro struggles to handle large figures in its limited memory.

So far you might have noticed that all our loops have had their control variables going from 1 TO some other value. Does this always have to be the case? The answer is no, as Program IV shows.

```
  10 REM Program IV
  20 FOR loop=3 TO 17
  30 PRINT "loop now has the value "
;loop
  40 NEXT loop
```

As you can see here *loop* takes values ranging from 3 to 17. It can even start at zero or a negative number as:

```
20 FOR loop=0 TO 17
```

and:

```
20 FOR loop= -1 TO 10
```

will show. The control variables takes the number after the equals sign and starts counting from there, going up by one for each cycle of the loop.

But what if you didn't want the control variable to go up in ones? Suppose for various devious reasons you wanted it to go up in twos or threes. Can it be done? Program V, which displays all the odd numbers between 1 and 10, supplies the answer and introduces a new keyword, STEP.

```
  10 REM Program V
  20 FOR loop=1 TO 10 STEP 2
  30 PRINT loop
  40 NEXT loop
```

Program V

What STEP does is to tell the micro the amount that the control variable is to be increased after each loop cycle. In this case the number is 2, so as the loop cycles *loop* takes the values 1, 3, 5 and so on. After the fifth repetition *loop* is 9, and 2 is added to it making it 11.

Now when the comparison is done *loop* is greater than the limit set (10) and the program leaves the loop. In this case it stops. If you want to see the final value of *loop* just add:

```
50 PRINT "The final value of loop is
";loop
```

As you can see it works in exactly the same way as before except now, because of the STEP, the control variable is changed by a different amount. In fact all we've done is change the assumptions the micro operates under. It assumes that FOR ... NEXT loops have STEP 1 unless told otherwise.

Try altering the number after STEP in Program V to other values such as 3 or 4. And can you get it printing out all the even numbers? What happens if you have a STEP that's bigger than the actual span of the control variable such as 11 or 12? Try it and see.

Of course the number after STEP doesn't have to be positive, it could easily be negative as Program VI shows.

```
  10 REM Program VI
  20 FOR loop=10 TO 1 STEP -2
  30 PRINT loop
  40 NEXT loop
```

Program VI

Here the STEP is −2 so obviously the control variable will be reduced by 2 for each loop cycle – note that now the figures around the TO are reversed to account for this.

Now we want the higher number as the first value and then this will be steadily reduced until the loop control variable is less than the final figure. If you don't take this into account and use a line like:

```
20 FOR loop=1 TO 10 STEP -2
```

you might be surprised by the results.

If you think about it you can never get from 1 to 10 in steps of −2. The micro has more sense than to try. However the loop is performed once before the control variable is tested against the limits set and seen to be silly. Hence the forlorn looking 1.

So if a loop doesn't repeat the number of times that it should check the limits of the control variable and the amount it is varying by. Try and see which of these lines are right and which wrong before you test them out in practice in Program VI:

```
  20 FOR loop=-1 TO -3
  20 FOR loop=-1 TO -3 STEP -1
  20 FOR loop=3 TO 5 STEP -1
  20 FOR loop=3 TO 5
```

Our final program for this month should give you a lot of experience of STEP.

```
  10 REM Program VII
  20 PRINT "What STEP";
  25 INPUT step
  30 FOR loop=1 TO 100 STEP step
  40 PRINT loop
  50 NEXT loop
  60 PRINT "The final value of loop
is ";loop
```

Program VII

Here you have the loop variable *loop* ranging from 1 to 100. You decide how the loop control variable changes. Play around with the program using different steps, both positive and negative. Don't feel obliged to stick to whole numbers – try fractions as well.

● *That should give you plenty to do until next month, when we step further into the world of loops.*

PROBLEM

I HAVE a single double sided Mitsubishi disc drive, configured as drives 0 and 2. I wish to fit a second drive, configured 1 and 3.

I understand I have to alter the internal links. Could you please give any details. – R. Swift, Sheffield.

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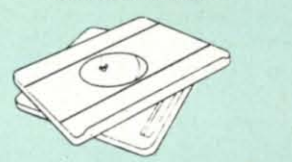

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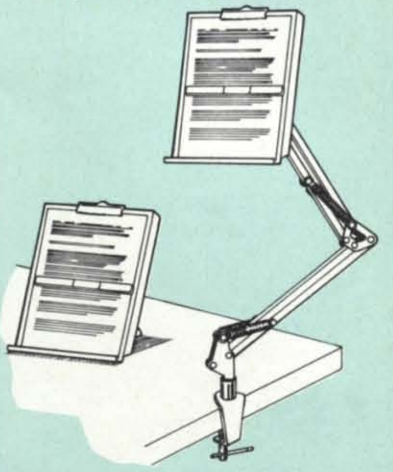

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WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

Special DISC UPGRADE OFFER

Acorn/BBC 100K Single Slimline 40 track Disc Drive and Watford's or Acorn's Single Density Standard Disc Interface Kit complete with Utility Disc and Manual.

Only **£99** (carr. £6)
(Offer valid while stocks last)

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**

ACORN WINCHESTER DRIVES

Complete with Level 3 File Server Software.

10 Megabyte **£1050.00**
30 Megabyte **£1549.00**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

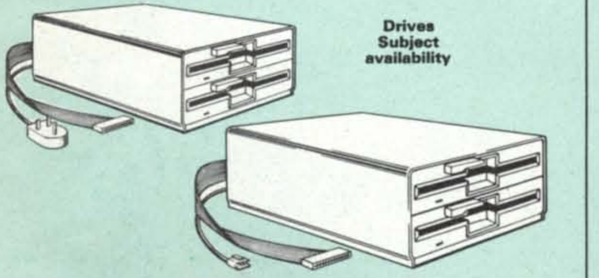
The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £75		CS 100 £116	
200K (360K)	CLS 200 £102	CLD200 £185	CS 200 £116	CD200 £199
400K (720K)	CLS 400 £104 £105 CLS400S	CLD 400 £185	CS400 £123 £124 CS 400S	CD400 £205
800K (1.44M)		CLD800 £194 £195 CLD 800S		CD800 £218 £219 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

All our switchable drives now have a smartly mounted **front panel** 40/80 switch for ease of use.

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£13**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£19**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£20**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£10**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£12**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£17**

- **3"** *Double Sided Discs* **£4** *each*

This month's
STAR OFFER

Buy any two packs of the 3M or our own brand TOP QUALITY DISKETTES and we will give you absolutely FREE – yes absolutely FREE – our 5" Floppy Disc Head Cleaner Kit.
(Offer valid while stocks last)

Special BULK OFFER on 5" DISCS
(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

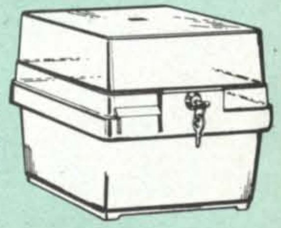
Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	£17	£42
M5	Double/Side Double/Density 48TPI	£21	£56
M7	Double/Side Double/Density 96TPI	£29	£70

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

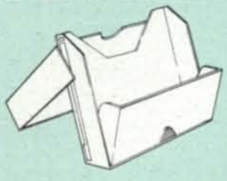
£4

LOCKABLE DISC STORAGE UNITS



Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 – holds upto 40 discs	**£9**
M85 – holds upto 95 discs	**£11**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

EPSON NLQ ROM
for the BBC Micro

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40 or 80 track (please specify) disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

ALL PRICES EXCLUSIVE OF VAT

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:
- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

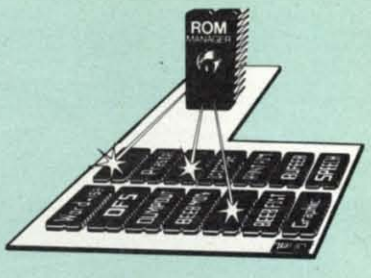
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

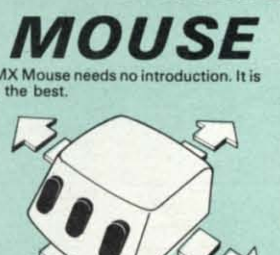
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

AMX DESK Package	**£20.00**
AMX UTILITY Package	**£12.00**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

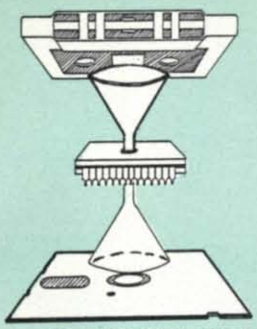
RB12 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

Price: **£50**

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface. Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

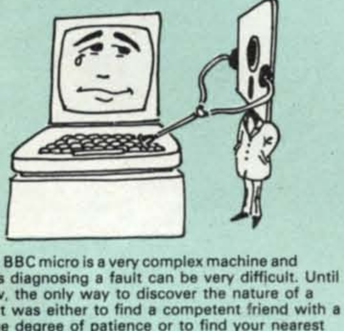
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ND
6502
HEX
REM
ASM
CHR$
FAL
LD
Z80

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**
Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ROMSPELL
ENGLISH DICTIONARY

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.
(Write in for technical details.)

£24

DISASSEMBLER ROM

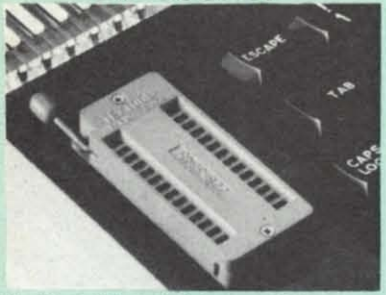
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued ⟶

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC B+ compatible. Is ideal for use with KAGA KP810 and GLP printers to allow easy swopping of preprogrammed FONT ROMs.

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

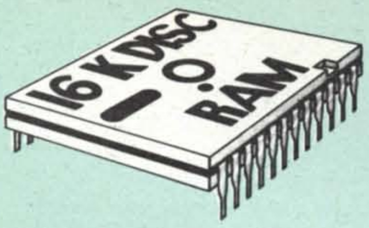
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches	**£2** each
Battery for Battery Backup	**£3**

All prices exclusive of VAT



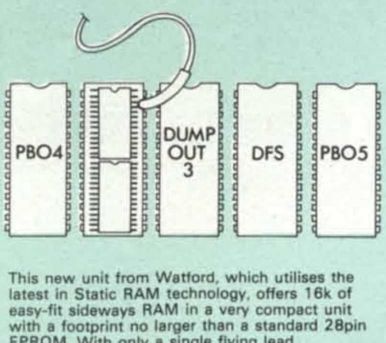
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

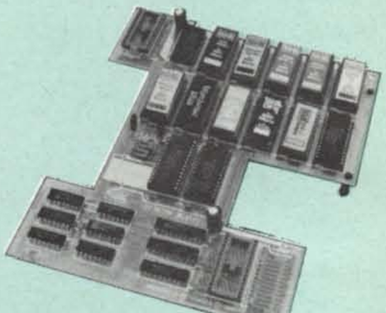
Do you find sideways RAM Boards confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 1.
- A small, basic module? Choose 1.
- A sideways RAM module for a ROM board? Choose 1, 2 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose 2 (3).
- Write protect for RAM (makes ROM look like RAM)? Choose 2 (3).
- Read protect (allows recovery from crashes)? Choose (3).

Key:
1) Solid State 16k Sideways RAM
2) 16k Disc RAM
3) 16k RAM module

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

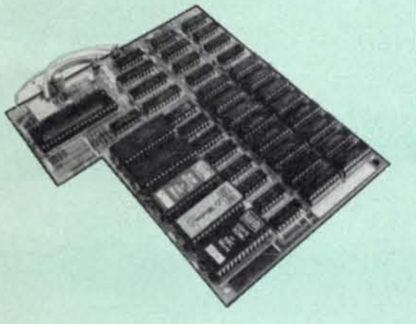
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£45***
● *ROM/RAM card with 64k dynamic RAM*	***£69***
● *ROM/RAM card with a massive 128k dynamic RAM*	***£109***

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£7***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2** each*
Complete ROM/RAM board (all options installed)	***£125***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to Micronet and FREE registration to MicroLink to start you up.*
- *BBC Master compatible.*
- *BT Approval applied for.*

Price: **£89**
(carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£115
(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

ISLAND LOGIC MUSIC SYSTEM only: £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

GLENTOP's 3D GRAPHICS

Development System **£22**

DATAGEM

Now compatible with Watford DFS's

Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

£59

BT TELEPHONE CONNECTORS

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£51
CARETAKER Basic Utility	£27
Graphics ROM	£25
Disc Doctor ROM	£25
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£28**

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£40

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £26

All Prices Exclusive of VAT

GRAPH PAD

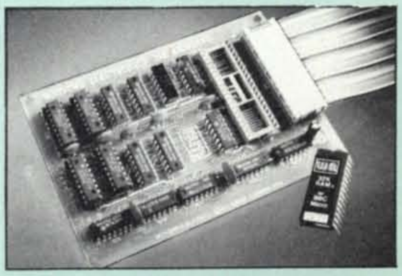
With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL !!!

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£39**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£38

VIEWSHEET (Acornsoft) **£39**

VIEWSTORE **£39**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

OMNIREADER

OCR at a price you can now afford

The manually operated omnireader is preprogrammed to read 4 common type faces – including: KAGA Courier 10, Courier 12, Letter gothic & Prestige Elite. It reads a line of text in about 3 seconds & is ideal for inputting already typed material into wordprocessor packages, such as View or WW, Databases or Spreadsheets. Comes complete with power supply, instruction manual, longrule & Dustcover. Also available on disc for the BBC is a utility program which merges input from the service port with the keyboard thus allowing full editing control whilst using the omnireader. Also included is a Basic program which displays the pixel map image obtained from the omnireader – ideal for doing your own OCR.

(As seen on the TV programme Micro LIVE)

Price: **£175**

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£13.50
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Micro add on guide	£7.95
BBC Micro Advanced Reference Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
BBC User Guide	£10.00
BBC Wargaming	£8.95
BCPL User Guide	£14
Business Applications on BBC	£7.95
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.00
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO -PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the BBC micro	£6.95
Programming the Z80	£19.95
Sencing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View Guide	£4.50
Viewsheet User Guide	£10
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Assembly Language Programming	£19.95

EPROM PROGRAMMER

The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

Continued →

OFFICE MASTER

Office Master

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

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For fuller description on any of the software titles on this page, please refer to Gemini's own advert in this publication.

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This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

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Life & Business Organiser

– *the ULTIMATE BBC utility!*

Features include:

- Automatic reminder of entries overdue for attention.
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- Urgent notice board.
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Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

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Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) sofket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM our advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

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Delta 14B/1 Adaptor Module	£12
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ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

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Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

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The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

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النور

ARABIC ROM

for the BBC Micro

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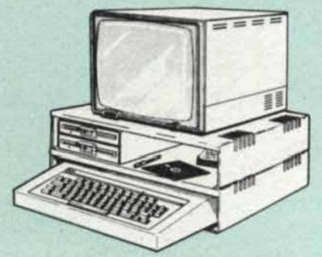
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
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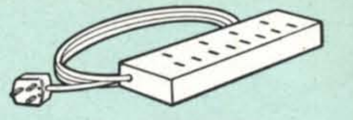
4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50 (carr £1.50)

ACORN MUSIC 500

The Acorn Music 500 System is probably the most powerful piece of music generating hardware available for the BBC Micro.

£72 *(carr £4)*

28 pin ZIF SOCKET (Textool) **£6.95**

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Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC+ & Watford (Not 1-42, 1-43) DFS's.

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Features:

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+ Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
= The most powerful disk utility available

Prices: £12.00 each for Vector 1 or Vector 2
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MUST NOT BE USED TO INFRINGE COPYRIGHT

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A program to teach traffic signs.

- High resolution colour signs
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NEW ★ RELEASE ★

The latest release from Chalice software, over 60 commands on a 16K ROM. The range of commands available means that there is something for every BBC user. For the disc user the ROM provides a skewed formatter to speed up disc access, a disc sector editor, disc search, verify and repair utilities, a useful free space command, plus many other handy commands. For the BASIC programmer, commands include search and replace on a global or selective basis, list active variable values, append BASIC program, move and copy lines, bad program repair, a highly effective routine to shrink BASIC programs down to a far smaller size etc. Other commands include disassembly, memory edit, graphics compilation, comprehensive file transfer utility, function key lister, envelope lister, rom lister, rom save, full rom status, switches roms off through <CTRL><BREAK>, send commands straight to a ROM, KEEP command, inverse video command, a command to send codes direct to your printer, memory search, base conversion, display character definitions, close open files and many others. All commands have been chosen on the basis that they are useful and not as space fillers.

Introductory price £34.95

OVER 60 COMMANDS

the SCYTHE

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everthing from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

PRICE £24 INCLUSIVE

ROM MASTER

ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can be switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified by their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

As a bonus feature for anyone who has files they want to keep from prying eyes, ROM master contains the commands SCRAMBLE & UNSCRAMBLE which will encrypt or de-encrypt a file based on an entered password. The encryption used is highly sophisticated so unless you know the correct password the files cannot be read.

PRICE £14.95

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All prices shown include VAT and p&p. Please add £3.00 per disk if you require 3'' disks and specify when ordering.

Utility that speaks for itself

Program: Speech!
Price: £9.95 (cassette), £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

AEONS ago I purchased an Acorn speech synthesiser costing £55 with 165 words to play with.

Next came Computer Concepts' Speech ROM which allowed you to create words phonetically, providing you had previously purchased the Acorn speech synthesiser.

Now along comes Speech! from Superior Software, a software-based utility which requires no additional hardware whatsoever. This 7.5k machine code program which is supplied on cassette or disc along with several other useful programs normally resides in memory between &5500 and &72FF.

However by using the relocation utility provided you can specify an alternative load address. Should you consider 7.5k to be too large a chunk of memory to lose you can always use the second version of the program which can be loaded into sideways RAM or even blown into an eprom.

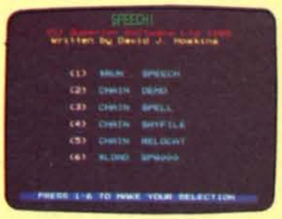
The BBC Micro's new found vocal chords are brought into life using the commands *SAY and *SPEAK. *SAY will make an excellent attempt at saying the sequence of English words which follow the command.

Question marks and full stops can be used to alter the intonation of certain words. Should you find that the computer has difficulty in pronouncing specific words correctly you can always use the *SPEAK command.

This gives you access to 49 phonemes or word sounds, from which you can construct your new word. Emphasis can be placed on a specific part of the word by following the vowel sound by a number between 1 and 8.

One utility program provided which cannot go unmentioned is Sayfile which will read from a named Wordwise or View file. It is weird to sit back and let the computer proofread my review before I print it out.

If I were a manufacturer of a speech synthesis product I would be greatly worried by the arrival of Speech!.



```
SPEECH!
Written by David J. Hoskins

(1) *RUN   SPEECH
(2) CHAIN  DEMO
(3) CHAIN  SPELL
(4) CHAIN  SAYFILE
(5) CHAIN  RELOCAT

PRESS 1-6 TO MAKE YOUR SELECTION
```

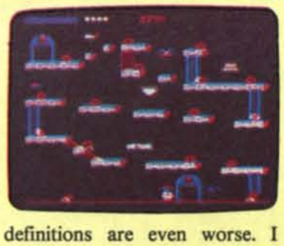
This is one utility which cannot be beaten on quality or price.

James Riddell

Sound	*9*
Graphics	*n/a*
Ease of Use	*9*
Value for Money	*9*
Overall	*9*

Bounty Bob strikes out

Program: Bounty Bob Strikes Back
Price: £7.95
Supplier: US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel: 021-359 3020.



BOUNTY Bob Strikes Back is a ladders and levels game and a sequel to a previous US Gold game, Miner 2049er.

In it Bounty Bob must reclaim the 20 separate caverns of Yukon Yohan's mine by standing on each piece of every platform. The sections of the platform change colour as Bob walks across them.

Bonus points are awarded for collecting goodies which hover in mid-air around the cave. Hazards are present in the form of radioactive amorphous blobs which patrol each platform.

Normally these mutants are fatal to the touch. However if Bob collects certain items the blobs change colour and it is Bob's touch which is fatal to the mutants.

The addition of different types of lift adds more variety to the screens. These have various modes of operation and some even take the form of matter transporters.

Graphically the game is a disaster. The background designs are crude and the character definitions are even worse. I found this surprising as US Gold's software is usually of the highest standard.

The graphics of the Commodore 64 version were created with loving care, but the BBC version must have been written during the programmer's tea break.

The back of the cassette cover shows a very impressive screen shot. To be fair they do state that this picture is from the Commodore 64 version – in tiny writing.

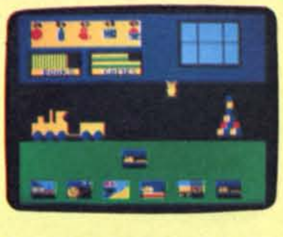
The ladders and levels section of the software market is one of the most competitive areas in which to launch a new game and I can't help thinking that Bounty Bob should have never struck back – he should have got out while he was ahead.

Jon Revis

Sound	*5*
Graphics	*4*
Playability	*5*
Value for Money	*5*
Overall	*5*

Magnificent Mr Men

Program: Mr Men Magic Story Maker
Price: £9.95
Supplier: Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN. Tel: 01-377 4600



I HAVE found all the Mr Men programs of high quality and of real educational value, and Storymaker is no exception.

This package, comprising two programs, is a real delight to use. It is designed to enable 3 to 6-year-olds to create their own stories on the screen.

I must admit that I've only used it with very young children. However their enthusiasm was astounding.

The first program is picture and word based with six carefully staged levels. The second introduces the concept of sentences and is definitely for older children. The first program can be used without words – the scenes are created using icons.

Both programs enable stories to be created with six different settings and a choice of eight different Mr Men.

They can do 18 different things and have six different moods. In addition the weather can be set to one of six choices.

The graphics are very good and appear on the screen instantaneously. The different weather conditions are not particularly inspiring – the snow is very disappointing.

The package includes an attractive booklet which can be used by older children to help them enter words and design scenes.

Facilities that are available in the software include the ability to reduce the volume level of the sound or to switch it off completely. Thankfully, pressing Break does not destroy the program but simply returns you to the start.

I can thoroughly recommend this software to any parent wishing to introduce young children to computers. It can also be used by early readers as a source of reading material and the focus of written work. Full marks to the Mr Men!

John Woollard

Sound	*8*
Graphics	*9*
Educational Value	*10*
Value for Money	*10*
Overall	*10*

With Bug Eyes big is beautiful

Program: Bug Eyes 2
Price: £7.95
Supplier: Audiogenic, P.O. Box 88, Reading, Berks. Tel: 0734 303663

AFTER completing her mission to destroy the Xxabanean flagship agent Zelda was captured and imprisoned in the depths of a desolate asteroid.

You are agent Starman and must negotiate the asteroid's defence systems and find the 25 keys which are required to free her.

Neither the title nor the rather mediocre cassette cover do anything to entice you to buy this game, which is a pity as the game is a stunner.

Bug Eyes 2 could be summed up by the term "big is beautiful". Each of the screens in this ladders and levels game looks like it has been painted with a four inch brush.

The 'graphics for both the background and the sprites are big, chunky and colourful.

The simplicity of each screen does not necessarily make the game easy. It has been designed in such a way that you feel each screen is merely a tiny portion of a larger unseen screen.

Some of these sub-screens are linked directly – for instance, falling off the edge of a cliff will take you straight into the screen below.

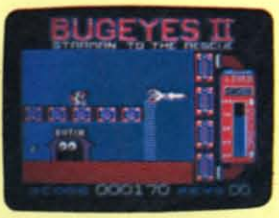
Other screens are accessed via the lift shafts which riddle the asteroid.

On leaving the lift you are hoisted on to a Sinclair C5 and driven to the next screen.

You enter the asteroid with five lives and a life is lost each time your oxygen supply is exhausted.

You can fall from any height without suffering damage but contact with an alien will deplete your oxygen supply.

The types of aliens range from huge spotted caterpillars to enormous dinosaurs which fly with the aid of jet packs.



Playing Bug Eyes 2 is relaxing and enjoyable, and for my money it is one of the best games of its type to date.

Carol Barrow

Sound	*8*
Graphics	*9*
Playability	*9*
Value for Money	*9*
Overall	*9*

Non-stop Commando action

Program: Commando
Price: £9.95
Supplier: Elite, Anchor House, Anchor Road, Aldridge, Walsall. Tel: 0922 55852

THIS is a game for the red blooded macho man who catches bullets in his teeth and eats three shredded wheat for breakfast.

Armed only with an M60 machine gun and six hand grenades you must make your way far behind enemy lines, annihilate the enemy troops and destroy their fortress.

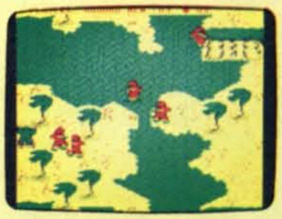
Commando is a clone of the arcade hit of the same name, and it's not a bad effort. Using joystick or keyboard you can move the soldier in any of eight directions and your bullets are always fired in the direction in which you last travelled.

Hand grenades differ from bullets in that they are always thrown up the screen irrespective of which direction you are travelling.

The action begins in a desert which is sparcely covered with trees and sand dunes. As soon as you appear you must start running forward while spraying bullets at anything which moves.

There's no chance of hitting any of your own troops as there are none – this is a suicide mission for which you drew the short straw.

Having survived the desert you encounter your first obstacle, for your foes are guarding a road bridge under which you must travel. Not only must you beware of soldiers coming under the bridge towards you but you must also avoid the hand grenades thrown by the motorcyclist who rides to and fro across it.



Following another stretch of desert you arrive at a high wall with a large gateway. As you approach the wall the gate opens and tens of troops rush out. These must all be killed before you are allowed to pass through the gate.

The next expanse of desert is riddled with trenches from which little men pop up and shoot at you. The game seems endless as you complete screen after screen of hectic action.

Commando provides the same kind of excitement I felt when I first played Elite many moons ago, and I shall go back to it time and time again.

Jon Revis

Sound	*7*
Graphics	*8*
Playability	*10*
Value for Money	*9*
Overall	*9*

Fun with lots of fizz

Program: Tapper
Price: £7.95
Supplier: US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel: 021-359 3020

"BARTENDER, gimmie another beer!" was the phrase which came to mind as I loaded up Tapper.

Here is an arcade game which is based around an old wild west custom, namely that of propelling the customer's drink the full length of the bar and hoping he catches it.

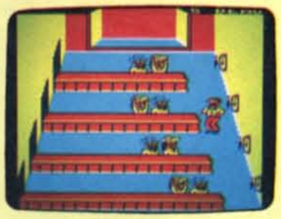
As Tapper is a family game the big, butch cowboys have agreed to drink soda pop.

The saloon has four separate bars and one barman. You must move him between the bars and dispense soda to the thirsty customers.

Any customers who do not have a drink will walk towards your end of the bar. Should they reach the end you lose a life.

The game begins at a relaxed pace with only one customer per bar and they can be served quite quickly. Having satisfied every customer you progress to a more hectic session where you have customers coming at you in twos and threes.

They slide their empty glasses back along the bar and if a glass falls off the end it will break and you lose another life. It's no wonder they're short staffed when breaking a glass incurs the death sentence.



Having successfully completed the two wild west scenes you are allowed to play the bonus game. In front of you is a bar on which are placed six cans of soda pop.

A mischievous critter known as the soda bandit repeatedly jumps up from behind the bar and shakes one of the cans. When five of the six cans have been shaken they all begin to change places on the bar.

If you can find the can which was not shaken you are awarded bonus points. If not you receive a face full of soda.

The game increases in difficulty as a growing number of customers enter the saloon.

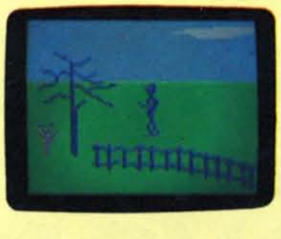
Tapper is the most enjoyable game I have played on the BBC Micro in ages. It is overflowing with good graphics, humour and plenty of fizz.

Carol Barrow

Sound	*9*
Graphics	*9*
Playability	*9*
Value for Money	*9*
Overall	*9*

Try making a micro movie

Program: MovieMaker
Price: £29.95 (2 ROMs + cassette)
Supplier: Slippery Slug, PO Box 83, Bath BA1 1ZA. Tel: 0225 69236



THE package comes on two ROMs together with handbook and demonstration programs on tape.

The 55 page handbook is comprehensive in its coverage of the many new graphics commands available, but unfortunately it becomes very technical too quickly.

The program is great fun to use and gives impressive results. The main graphic drawback is that because it works in Mode 7 all shapes are limited to those chunky teletext pixels.

This allows rapid movement cycles but restricts figures to being little more than stick men.

Initially you use the cursor keys to create shapes. You can define up to 200 and there are many functions which allow storage, recall, amendment and duplication.

For background the screen is treated as a camera which can pan over an area about 100 times bigger than itself. Anywhere on this area you can put scenery shapes such as trees, buildings and mountains.

They are fixed on the map and appear as the camera moves to their location. For the movie part a shape, perhaps a man, is selected and moved around against the background using the cursor keys in eight possible directions.

The program remembers each move and can repeat them at a definable speed giving the moving cartoon effect.

At the same time using the Cycle editing procedure the shape can be doctored frame by frame.

The figure can be made to move arms and legs, grow extra bits, enlarge or shrink – all the familiar tricks of the real movies.

You can change colours which adds to the animation. Cartoons are limited only by your imagination and artistic ability – most of you will surely do better than the feeble demonstrations provided.

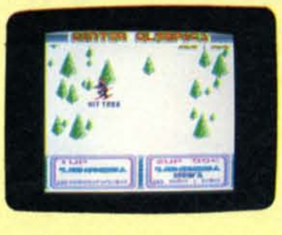
MovieMaker is an enjoyable challenge that offers an excellent insight into the world of movie cartoon creation.

Terry Hallard

Sound	*n/a*
Graphics	*8*
Ease of Use	*8*
Value for Money	*8*
Overall	*8*

Warm way to winter sports

Program: Winter Olympics
Price: £7.95
Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon NE21 4TE. Tel: 091 414 4611



WINTER Olympics is another of the several-games-in-one variety.

The first event to flash up on the screen is speed skating. In this you take your competitor along a 200 metre course as quickly as possible, while the computer operates a pace-making opponent above you.

You move your player by rapidly hammering the Z and X keys, while a clock ticks away at the base of the screen.

The second event is the ski jump which works like the first event in that the faster you hammer the keys the further you jump.

Event three is the ski slalom. You have to guide your skier down a slope, zig-zagging through the gates as quickly as possible.

Missing a gate or colliding with a flag costs you a 10 second penalty, and this makes for a challenging time. Even the most nimble-fingered will have trouble here.

Then comes downhill skiing. No gates this time, just a full pelt down the slope, trying to avoid the fir trees.

Event five is the bobsled, and the formidable Cresta Run. The course is mapped out on the right of the screen and in a box on the left is your view from the sled.

Gravity provides the acceleration here, and the Z and X keys are used as brakes. Too much and you lose a lot of speed; too little and you shoot out over the side of the run and into oblivion.

Lastly comes the Curling, which is probably the most disappointing event. The aim is to get your four stones as close as possible to the centre pin, while your opponent does the same.

Unfortunately there is no allowance for stones colliding. Thus it is impossible to knock a stone out of your way – you just stop short of it.

After a little practice it becomes quite easy to get the maximum 15 points and the event becomes an anti-climax.

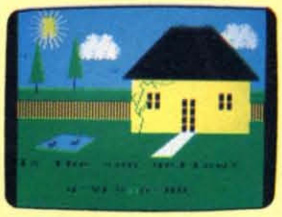
One further drawback I should mention is that after events two, four and five the tape has to wind on to program the next events.

At the end, to have another game you need to wind the tape back to a point near the start.

Overall this is a nice little package and fun to play. The graphics are quite good, sound is used well and the BBC clock has never been so useful.

James Bibby

Sound	*6*
Graphics	*8*
Playability	*7*
Value for Money	*7*
Overall	*7*



Dated offering

Program: Educational Compendium
Price: £19.95
Supplier: Clare's Micro Supplies

A COUPLE of years ago the five programs included in this compendium were available separately for a total of £32, so to have them collected on one disc at a shade under £20 represents a considerable saving.

I first saw these programs when the BBC Micro was arriving in schools a few years ago.

Since then several competent and original software houses have moved into the educational market and these Clare's programs now look rather jaded.

The program Counting is a simple way to reinforce numbers, and you can select the range within which the child works.

Garden shows the best use of the Mode 7 graphics, presenting a picture of a house, pond, sky, and so on.

Questions are asked, to which the answer is either Yes or No, and the child merely supplies the choice.

Take-1 introduces simple subtraction by asking the child to count up objects, such as dogs and gnomes, and then asking how many would be left.

Hue Men and Shape Men are both matching games, obviously with colours and shapes as the variables.

This compendium is possibly worth looking at, but don't think you'll get up-to-date software.

Phil Tayler

Sound	*5*
Graphics	*6*
Educational Value	*7*
Value for Money	*5*
Overall	*6*

See
INTER-SHEET
INTER-CHART
and for the first time
INTER-WORD
INTER-BASE

also see the brilliant new spelling checker ROM, and hear the 'Text To Speech' system on Stand No. 94 at the Micro User show in the Horticultural Halls, London 16th-18th May.

INTER-WORD

In the past we have produced WORDWISE and WORDWISE PLUS, the most successful word processors for the BBC Micro. INTER-WORD is our latest and our best; this program is 32K long (twice the size of WORDWISE PLUS and four times the size of WORDWISE) ensuring that it has more features than any other, and is far easier to use. And of course INTER-WORD is part of the only truly integrated set of ROMs for the BBC Micro.

We intend to sell this for the first time at the BBC Micro User show (at a special show price). We are so sure that you will agree that this is the best word processor, that we are prepared to give a money back guarantee if you are not satisfied.

SPELLING CHECKER

We will be showing the new spelling checker ROM designed to have 50,000 words on a single chip. This means that no discs are required and that it is extremely fast. User defined dictionaries are possible in sideways RAM or disc.

This supports real time spelling checking (checks as you type), and is designed to be totally compatible with WORDWISE, VIEW, and the new INTER-WORD.

Other features include crossword solving, file checking, sound-alike checking etc. Many of these features are available directly from within other ROMS such as VIEW or BASIC.

INTER-BASE

This is the last part of the ROM-LINK series and will be demonstrated, but not yet on sale. It out performs all other database ROMs on the BBC Micro and many other machines and provides a totally flexible data handling system.

FAST BASIC

We will be showing the new 68000 based computer running our new 'FAST BASIC,' the fastest BASIC interpreter in the world. This system offers 512 colours, 512K RAM, 192K ROM, running the GEM operating system (windows and a mouse). It works with BBC disc drives, monitors, printers etc and costs only **£399.**

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Computer Concepts

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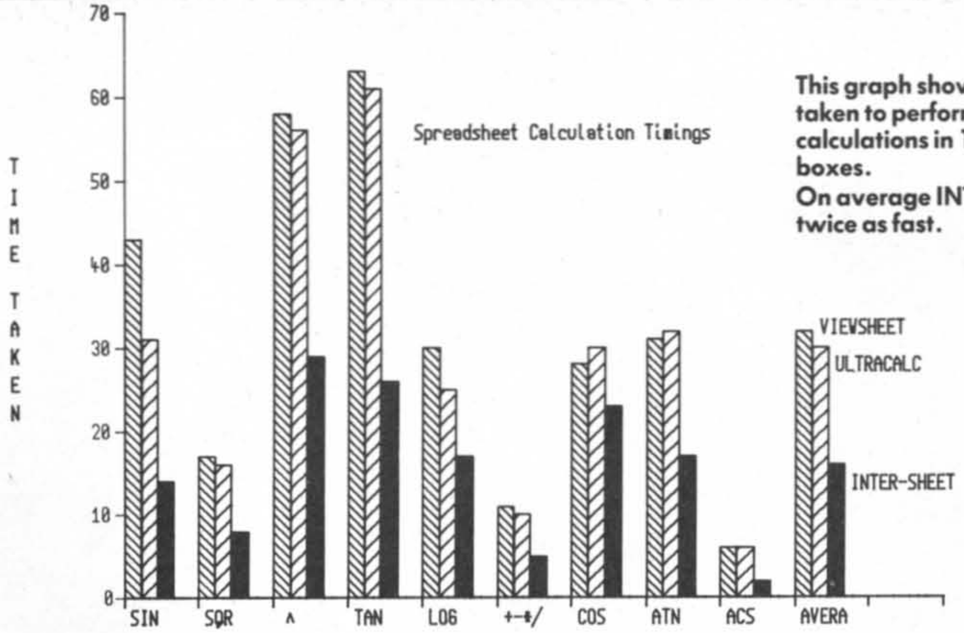
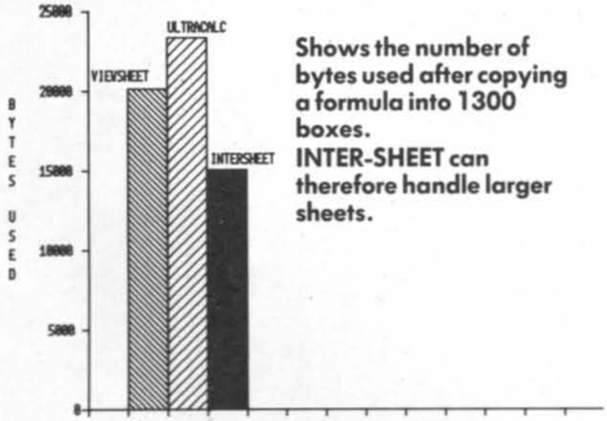
BARCLAYCARD VISA

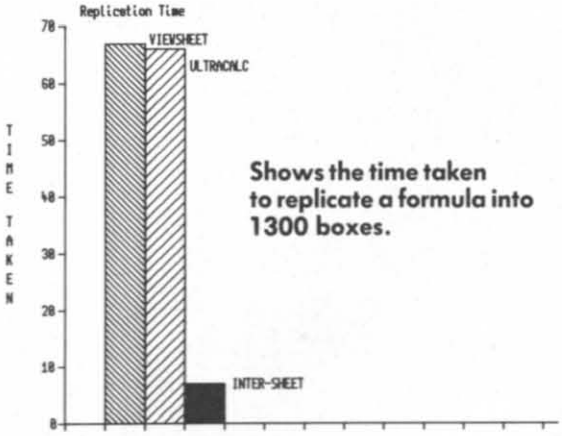
PERFORMANCE BETWEEN THE SHEETS



This graph shows the time taken to perform various calculations in 1300 or more boxes.
On average INTER-SHEET is twice as fast.



Shows the number of bytes used after copying a formula into 1300 boxes.
INTER-SHEET can therefore handle larger sheets.



Shows the time taken to replicate a formula into 1300 boxes.

All the above graphs were produced on INTER-CHART

INTER-SHEET is the only spreadsheet that supports:

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- Full help menus
- Integration directly with other applications
- Up to 16 sheets in memory at once
- Import and export to and from word processors
- PLUS, it costs less than other ROM based spreadsheets

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Disenchanted with the commercial variety? Then take a tip from ALAN HOOD and try out his...

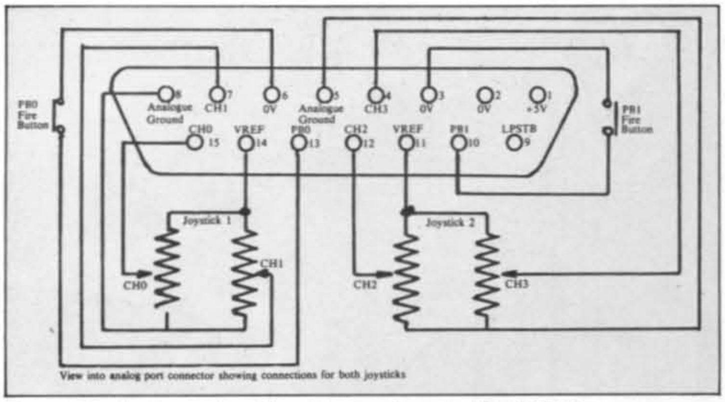

PB0 Fire Button
8 Analogue Ground
7 CH1
6 0V
5 Analogue Ground
4 CH3
3 0V
2 0V
1 +5V
CH0 15
VREF 14
PB0 13
CH2 12
VREF 11
PB1 10
LPSTB 9
PB1 Fire Button
Joystick 1
Joystick 2
CH0
CH1
CH2
CH3
View into analog port connector showing connections for both joysticks

Figure I: Standard connection of joysticks to analog port of the BBC Micro

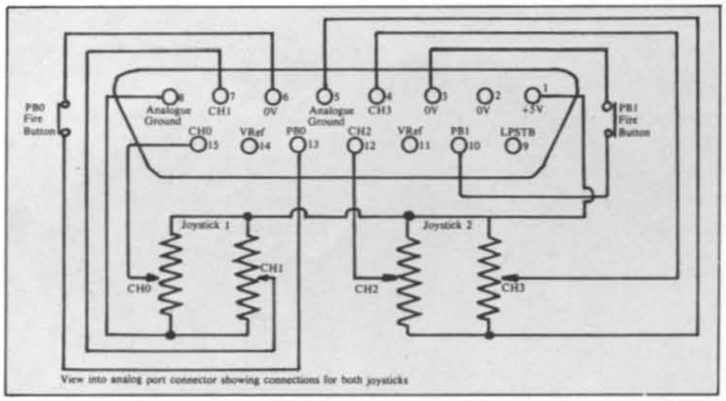

PB0 Fire Button
8 Analogue Ground
7 CH1
6 0V
5 Analogue Ground
4 CH3
3 0V
2 0V
1
CH0 15
VRef 14
PB0 13
CH2 12
VRef 11
PB1 10
LPSTB 9
PB1 Fire Button
Joystick 1
Joystick 2
CH0
CH1
CH2
CH3
View into analog port connector showing connections for both joysticks

Figure II: Alternative connection to the +5V supply to achieve a greater voltage swing

HIGH quality metal gimbal joysticks are available from manufacturers of parts for model radio control systems and are a great improvement on the usual BBC Micro joysticks.

However the use of a radio control joystick with standard potentiometers gives far too little movement when used on the micro's analog port.

The normal recommended connection is shown in Figure I, where the positive ends of the potentiometer tracks are fed from the 2.5 volt reference source (V_{REF}) provided by the A/D converter (NEC D7002C) in the BBC Micro

The analog input voltage range for full scale is 0 to about 1.8 volts, and since a radio control joystick only allows roughly 60° rotation of the shaft out of the normal 270° there is only about 30 per cent movement which is inadequate for many applications or even for games.

An instant increase in the movement can be obtained by connecting the positive ends of the tracks directly to +5 volts, as shown in Figure II. This doubles the voltage swing at the analog inputs, but at the expense of the high degree of voltage stability achieved using V_{REF}.

The slight variation of the +5 volt

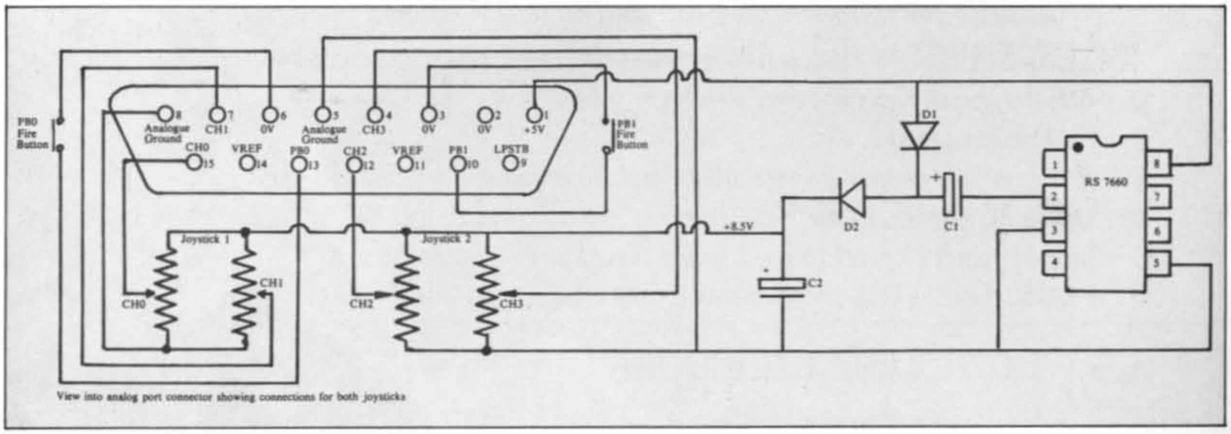

PB0 Fire Button
8 Analogue Ground
7 CH1
6 0V
5 Analogue Ground
4 CH3
3 0V
2 0V
1 +5V
CH0 15
VREF 14
PB0 13
CH2 12
VREF 11
PB1 10
LPSTB 9
PB1 Fire Button
Joystick 1
Joystick 2
CH0
CH1
CH2
CH3
+8.5V
D1
D2
C1
C2
RS 7660
1
2
3
4
5
6
7
8
View into analog port connector showing connections for both joysticks

Figure III: Connection of a 7660 voltage converter to obtain full voltage swing

FLY ME JOYSTICK

supply is only just noticeable when using spring centre joysticks.

This is tolerable for most applications but still only allows about 60 per cent full voltage swing.

The potentiometers will have to be recentred after this change, and care must be exercised to avoid more than 2.5 volts appearing on the analog inputs to the A/D converter, otherwise it could be damaged.

A very simple answer which gives full voltage swing and hence full movement is to use a 7660 voltage converter wired as shown in Figure III.

This 8-pin DIL CMOS integrated circuit used in its positive voltage multiplier configuration increases the 5 volts available to about 8.5 volts at a power efficiency of 98 per cent.

The only extra components required are two 10 uF capacitors and two diodes. This increased voltage fed to the potentiometers now gives essentially 100 per cent voltage swings at the converter inputs.

The original was built on a small piece of Veroboard and installed into the small box containing the joystick using double sided tape. A possible layout is shown in Figure IV.

All the parts must be inserted the correct way round.

Again the potentiometers will require to be mechanically adjusted to restore the correct centre positions, and care must be taken not to exceed the maximum voltage allowed at the analog inputs.

If this is a worry 2.7 volt zener diodes can be wired from each potentiometer's centre contact to 0 volts, as shown in Figure V. Substitution of the 1N4148 silicon diodes by OA47 germanium diodes will result in a slightly higher voltage from the 7660 converter if required.

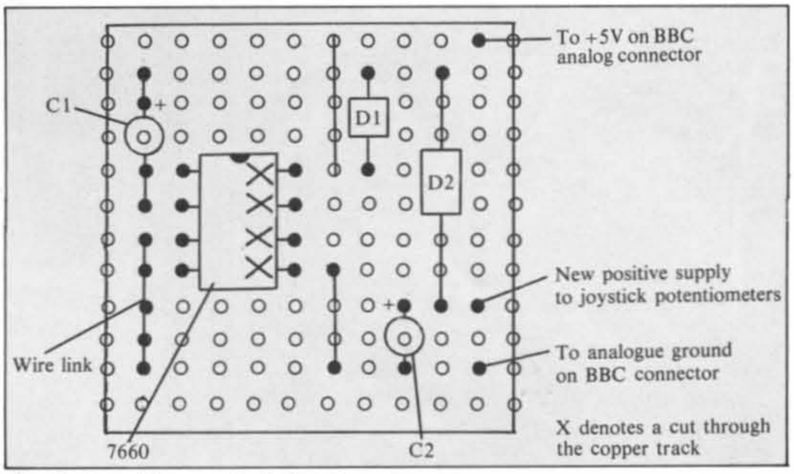

To +5V on BBC analog connector
C1
D1
D2
New positive supply to joystick potentiometers
Wire link
To analogue ground on BBC connector
X denotes a cut through the copper track
7660
C2

Figure IV: Layout diagram using stripboard

PARTS LIST

1 ICL7660CPA voltage converter IC. Radiospares part No. 304-598.
1 8 pin DIL IC holder.
2 10 uF 16 volt tantalum capacitors (C1 and C2).
2 1N4148, or 1N914 signal diodes (D1 and D2).
1 Small piece Veroboard (0.1in pitch holes).
1 High quality joystick assembly with linear potentiometers in the range 1k ohm to 10K ohms.

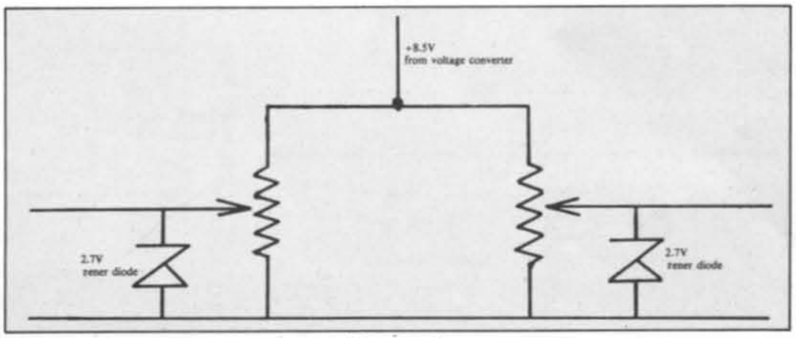
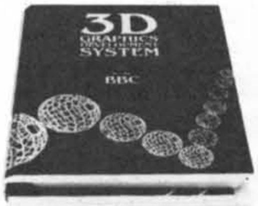

+8.5V from voltage converter
2.7V zener diode
2.7V zener diode

Figure V: Diagram showing the connection of the optional 2.7V zener diodes to the joystick potentiometers

3D GRAPHICS
DEVELOPMENT SYSTEM

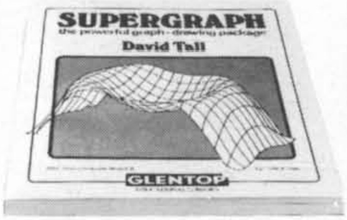


Simply the most sophisticated 3D Design and Animation System for the BBC micro, for the amazing price of only £25 including VAT.

A complete Development System which provides a sophisticated design tool for creating any 3D object. Includes a unique high performance 'Real-time' Applications system allowing you to produce stunning animation of designs in your own Basic or Assembler programs. The system is ideal for 3D CAD and is an excellent educational tool for visualising molecular structures and 3D geometry. Simulations and Elite-type games are also easily produced.

The whole package comes complete on two discs (40 or 80 track) with a comprehensive 96 page manual.

SUPERGRAPH



Supergraph is the most powerful, yet easy-to-use, set of function plotting programs available for the BBC micro at only £28.85 including VAT.

The standard routines are suitable for young children meeting coordinates and graphs for the first time, while the more subtle facilities are appropriate for Advanced through to University level.

The disc includes:

- Supergraph - the main graph drawing program
- Super-Zoom with extra facilities including a 'zoom' option
- Superprint - a screen-dump for Epson compatible printers
- A series of demonstrations and a disc back-up facility.

The package, supplied with a 40 or 80 track disc, comes complete with a clear and comprehensive 144 page manual.

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With the **MOVIE MAKER** software package from *Slippery Slug* **ANY** user can create impressive animated films or graphics displays.

A flashing pen is moved around on the screen by using the four arrow keys and is used to draw items of background scenery. The screen can be scrolled over the scenery to give a virtually unlimited area.

Use the pen to draw your animated characters, each up to about one quarter screen size. Their movement over the scenery is programmed by simply moving them around with the arrow keys.

SOME MOVIE MAKER FACTS

Text can be used in the form of subtitles, scrolling *bubble messages* which appear above the character that's speaking, or even as part of the background scenery.

The characters can also be easily programmed to move arms and legs, change colour or shape in any way, and to grow or lose extra parts of any description.

The teletext graphics system has been used throughout. This enables **MOVIE MAKER** to playback your movies at an incredible speed of 22 frames per second. And also enables a single movie to be over 20 minutes in length.

THE MOVIE MAKER PACKAGE

The package contains two 16K ROMS; USER GUIDE; key strip; scenery planning map; and a tape containing a 20 minute demo movie, an intro show, and playback software to run your movies on micros without **MOVIE MAKER** fitted.

Requires a BBC model B, B+, or MASTER micro, tape or disc based. Can be run in sideways RAM.

Mail order price **£29.90** fully inclusive. Or for a detailed description of **MOVIE MAKER'S** extensive facilities send £1.95 for the introductory pack (price refundable against purchase) which contains an intro tape and brochure.

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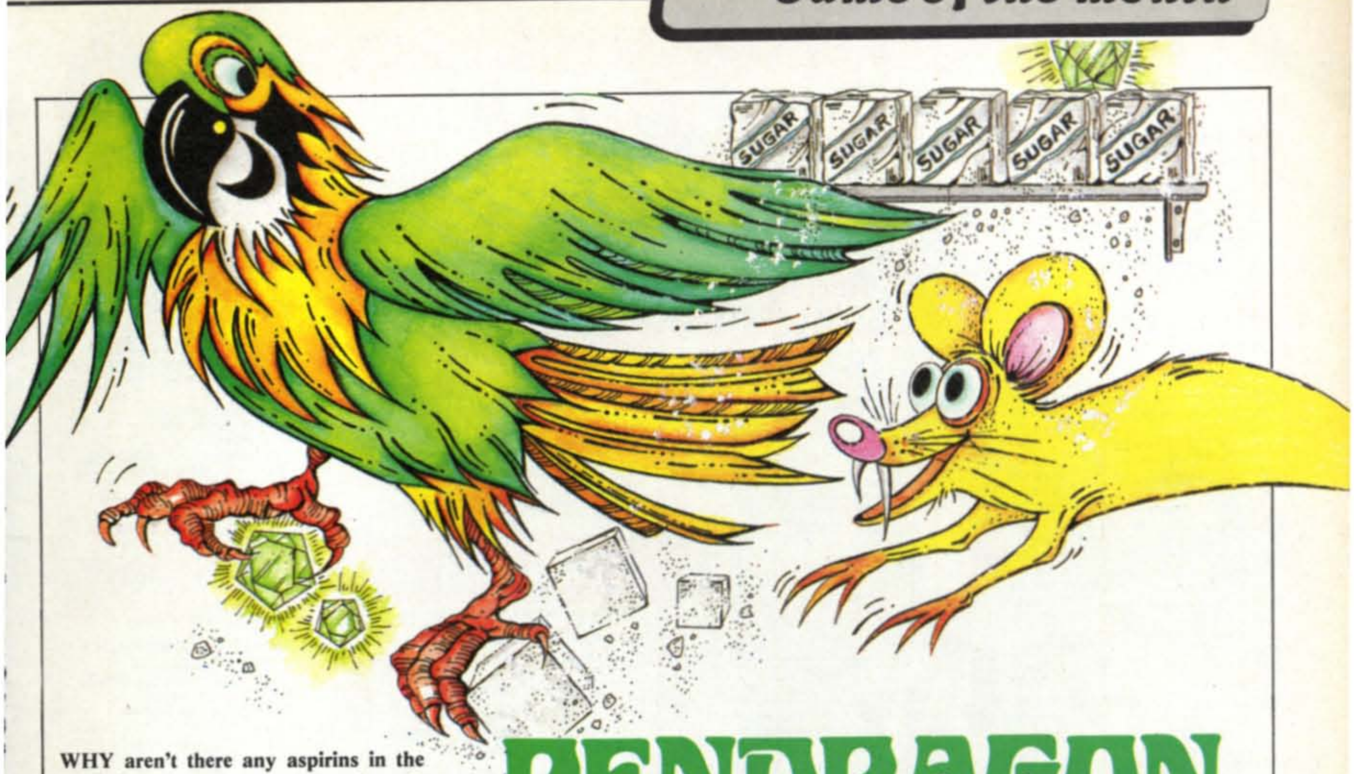


PENDRAGON

By GORDON KEY

WHY aren't there any aspirins in the jungle? Because the parrots eat 'em all. You must have heard that one before, but did you know the reason for this surprising deficit of pain relievers?

It all boils down to the local employment situation – jobs are scarce in the jungle and the only place that a hard working parrot can earn a living is in the sugar cube factory, sorting cubes and trying to keep the vermin – known locally as the yellow peril – out of the store rooms as they eat the sugar.

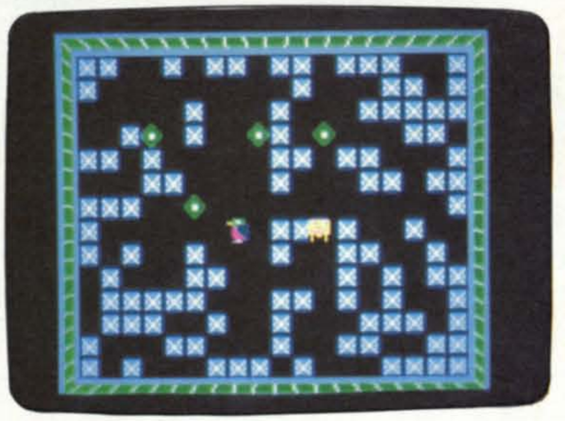
One sideline of the sugar industry is a thriving emerald mine. It is therefore also part of the job to sort out the valuable emeralds that are mixed in with the sugar and deposit one in each corner of the store room.

One small point about the yellow perils – they have quite an appetite for parrot as well as sugar and can give a nasty bite, so it pays to avoid them if at all possible. If that isn't enough to give a parrot a headache I don't know what is.

Our hero of the day is one Polly Pendragon, an able young parrot but a little green about the ears, so he would appreciate some guidance from you. To help him carry out his duties you should use these keys:

Z	Left
X	Right
:	Up
/	Down
Space	Push/crush

The manager tends to leave his radio switched on all day so if the music gets irritating you can switch it off by pressing M.



The program is some 16k in length and runs on a B or B+ with either tape or disc filing systems. To make this possible it uses a procedure called PROCshorten to shorten the length of the program after the main initialisation has been completed.

A detailed explanation of this procedure can be found in the February 1986 issue of *The Micro User* as part of the article on Tipaka.

In brief it has the effect of throwing away all coding that is called only once in the program, such as assembler, character definitions, initiation procedures and the like.

Before running the program please ensure that you save it, as the action of PROCshorten will cause over 60 per cent of the program to be lost.

Also, there mustn't be any leading spaces between line number 3510 and THEEND. It must be typed 3510THEEND as PROCshorten will not recognise 3510 THEEND.

If PAGE is set to a higher value than &E00 the program will self relocate to &E00 and select the tape filing system. If you have a DFS that leaves PAGE at &E00 you should enter *TAPE before running the program as PAGE &D is used for data storage and this is normally disc workspace.

Full listing starts on Page 112

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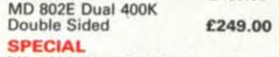
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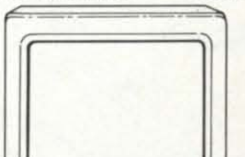

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Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer **£149.00**

MODE EXPOSITION

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In the manual mode, data which has been received is sent to a selected printer and directly printed out. Copy is also available by pressing the COPY key.

2. Double Mode
In the double mode the same data which has been received is sent to two printers simultaneously and printed out. Copy print is also available by pressing the COPY key.

3. Free Mode
In the free mode the command VT and FF code are read as a data fill end code. Of the two printers the data is automatically sent to whichever unit is free for service first. This means that the print time of a amount of data is minimized by using two printers without regard to the data list size.
NOTE: This means that if you try to print two reports at the same time, on two printers, the printers may intermix pages.

4. Command Mode
In the command mode the operation is similar to the manual mode. Data sent is not determined by the SELECT key, but by a certain command the required printer is selected and the number of copies is assigned. This command is internally processed as a control code and is not output.

5. Clear Key Mode
The clear key mode is furnished for cleaning an error occuring during the printing and data input. The function is to stop the printer currently under operation and erase the copy count. However, only the last data input remains and can be reprinted by pressing the COPY key.

FEATURES

1. A printer currently under operation is indicated by an LED, and therefore is immediately known.
2. The copy capacity is available up to 255 sheets. The number of copies expressed in a binary mode by LED (up to 15).
3. The Buffer is furnished A 64K RAM as standard, optionally expandable in increments of 64K, up to 256K and can be connected to most printers and CPU's.

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...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epsom and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets.
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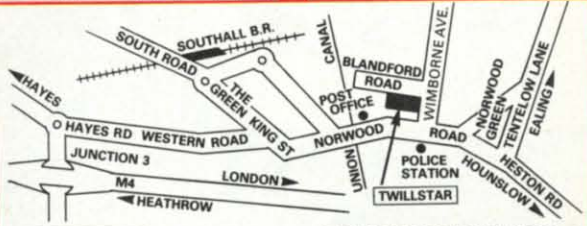

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Start of a new series

MAKING THE MOST OF THE MASTER

RORY McCLOY shows how to go about it

I WAS one of the first people to rush down to my local Acorn dealer and order a Master 128 as soon as they were released in January and by the second week in February it arrived.

There seems to be some delay in deliveries now that everyone is after a Master. But should you rush out and buy one? Is it worth £499? What does the Master offer that the BBC Model B failed to, and how do you make the most of the new facilities?

In this series of articles I will try to answer some of these questions from an everyday user's point of view.

Users have their own idea of what they want from their computer and it is important to bear this in mind when reading reviews. I am a surgeon and have three main requirements – a word processor, a powerful database and a research capability involving statistics and the ability to interface the computer to equipment for data display and analysis.

At home I dabble in Basic programming but do not use the sound or the games functions.

As soon as I took the Master out of its packing and plugged it in I couldn't resist typing *TIME to see what happened. To my surprise the exact correct day, date and time appeared on the screen. It was a nice finishing touch for Acorn to set the internal battery-supported clock before it left the factory.

I had half expected to have to buy my own battery and I wasn't far out – the reference manual was additional to the £499.

The 250 page welcome guide spends 44 pages on introducing View and ViewSheet but only 13 pages on the four filing systems. The Basic language is covered in 70 pages, which include graphics and sound, and the keywords are summarised in an eight page appendix.

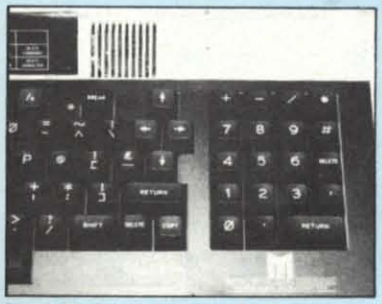

Figure I: The new look end of the Master's keyboard

TOP, HIMEM, PAGE and ENVELOPE are considered outside the scope of the welcome guide as are the DFS commands *LOAD, *SAVE, *LIST and *TYPE. Fortunately, the Welcome disc (and tape) is a different animal and I will deal with this later.

My immediate impressions are that the Master embodies many of the features that could, and should, have been on the original model B. Figure I shows the new end of the keyboard which influenced me to upgrade to the Master, particularly in view of the nature of my work.

The Break key has been distanced from key f9 and can be physically locked by inserting a screwdriver through the small hole to the left of the key and turning a plastic cam to prevent it moving.

The cursor keys now lie in a configuration appropriate to their function, which certainly makes for more accurate use during word processing, but I would have liked a bit more separation from the keys to their left.

The quality of the keyboard is far better than my three-year-old model B but I suspect it is similar to that of the B+. One advantage is that if Caps Lock is on the Shift key produces lower case letters. All the DFS/ADFS commands, but not Basic keywords, can be in upper or lower case.

The numeric keypad is essential if you need to type in more than a few numbers. It is also nice to be able to use the mathematical operators + – / * without having to use the shifted keys on the main keyboard. By the same token the numeric keypad keys are not subject to shift unless you enable this facility with *FX254,0.

It is possible to redesignate all the keypad keys as a block, using *FX238,n. By default n=48 so that the bottom left key is zero, but n=128 sets the keypad keys 0 to 9 to reproduce the function keys f0 to f9 and n=64 for keys 1 to 9 to reproduce A to I.

However the non-numeric keys on the keypad do not have consecutive Ascii values, so they take on rather odd functions following redefinition, consequently I have not found this FX command especially useful.

The 50 extra bytes of memory in CMOS RAM, which distinguish the Master 128 from its prototype (or was it a stop-gap?) the B+ 128, are responsible for the start-up configuration of the Master. Thanks to the battery this memory is maintained after switch-off.

The pattern of these start-up options can be predetermined using the cleverly designed control panel on the Welcome disc by typing *RUN $.LIBRARY .PANEL (see Figure II).

The options can be changed by using the cursor keys to jump to the box on

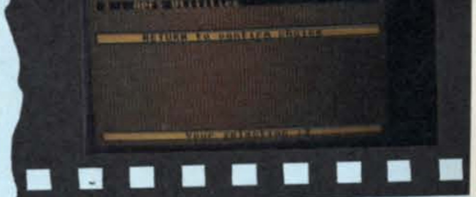

Figure III: Welcome disc menu

the panel you wish to alter and then using the Shift+cursor keys to alter the display to your personal requirements.

When you press Escape to exit from the Quit box the CMOS RAM is configured for your next switch-on. The first box after Quit sets the *TV command and it is nice to see the entire control panel display move up and down on the screen as you set this option to suit your TV or monitor.

In addition to the ordinary screen modes 0 to 7 there are eight shadow screen modes – 128 to 135 (simply add 128 to mode number) where the screen memory is switched into a parallel memory bank leaving nearly 30k of memory free in every mode.

I choose to start-up in Mode 131, shadow mode 3, as I can read 80 columns easily on my high resolution monochrome monitor – together with Basic language, the ADFS and parallel printer all set. My secretary prefers View as the start-up language, and a serial printer set, so that she can start word processing straight away with the daisywheel printer.

Setting the bell to half tone makes late night work possible without waking the family and I have doubled the speed with which the cursor key moves round the screen by setting the delay to 5 (hundredths of a second) instead of the default setting of 10.

The first time I used my serial daisywheel printer with the Master it typed out rubbish whereas it had been fine with the B. I had to set the printer transmission baud rate to 9600 – the default setting for the B.

You can determine which control characters are sent to the printer – serial or parallel – so that you don't have to dive into the innards of your printer to set dip switches to control line feeds.

Of course if you do not wish to go to the trouble of running the control panel program all the options in CMOS RAM can be set directly using the *CONFIGURE (*CO.) command, as shown in Table I. I find this much more convenient for the odd change you want to make after your initial setting up.

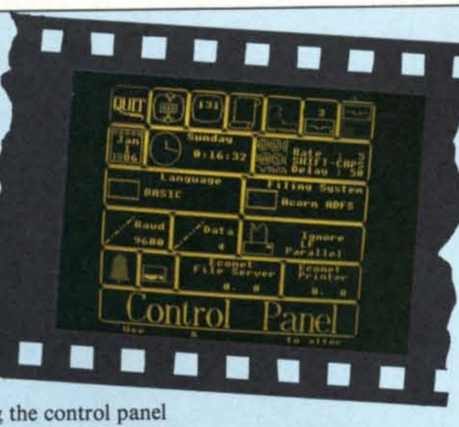
QUIT
131
Jan
1986
Sunday
0:16:32
Rate
SHIFT-CAPS
Delay
Language
BASIC
Filing System
Acorn ADFS
Baud
9600
Data
4
Ignore
LF
Parallel
Econet
File Server
0. 0
Econet
Printer
0. 0
Control Panel
to alter

Figure II: Control panel to set start-up options

Typing the command *STATUS will display the present option settings. While many of these features could be set on previous BBC models using appropriate *FX commands, on the Master they are all set automatically on switch-on.

The double-density Welcome disc runs under the advanced disc filing system and is a useful way to get used to the intricacies of the ADFS hierarchical directory system (read Jim Notman's review of the ADFS in last December's *Micro User* p.141). Put the disc in the drive, mount it using *MOUNT, and type one of the new DFS commands *FREE which should reveal:

```
0001D7 sectors = 120,576 bytes free
000829 sectors = 534,784 bytes used
```

So the disc contains over 500k of programming. This is in 63 files divided between three directories, the root directory $, Library and Help.

After you have set the disc to 40 or 80 track by CHAINing either $.Welcome40 or $.Welcome80 you can boot the disc with Shift+Break and display the welcome menu page, as seen in Figure III which has a professional 16 bit look to it.

The welcome programming and ADFS utilities pages are shown in Figures IV, V and VI. The latter menu contains those ADFS utilities they failed to squeeze into the Mega-rom. The disc contains several useful Basic programs:

COPYFILES: Copies files from one filing system to another, either single or multiple, and is an essential utility if you are converting all your old DFS files to the ADFS system.

DIRCOPY: Copies all the contents of an ADFS directory to another directory.

EXALL: Displays information on all files in all ADFS directories.

CATALL: Catalogues all files in all directories on an ADFS disc.

HARDERROR: Enables permanent disc errors to be ignored.

RECOVER: Recovers all or part of an accidentally deleted disc file.

Unfortunately there wasn't room in

→

Welcome Utilities
ADFS Tutor
Control Panel
RETURN to confirm choice
Your selection :

Figure IV: Welcome utilities

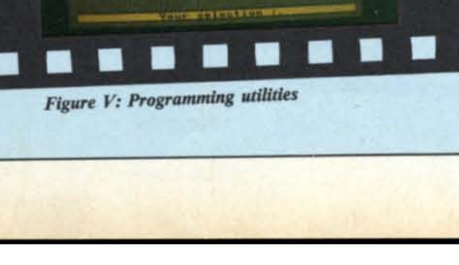
Programming Utilities
1 : Character Designer
2 : Envelope Editor
3 : Pattern Fill Editor
RETURN to confirm choice
Your selection :

Figure V: Programming utilities

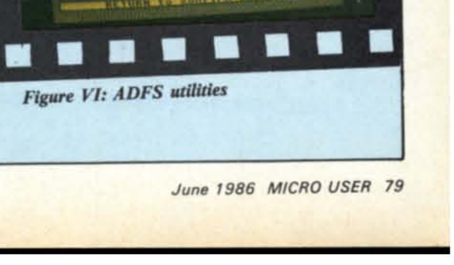
ADFS Utilities
Aform
Verify
Backup
Dircopy
Copyfiles
Catall
Exall
Harderror
Recover
to execute star command
Number keys to run utilities
SHIFT number for help on utilities
RETURN to confirm choice

Figure VI: ADFS utilities

From Page 79

ROM for *AFORM – this formats an ADFS disc – *VERIFY and *BACKUP, which I consider vital everyday utilities, so they end up on the Welcome disc.

Therefore the first eprom I have plugged into my Master is the Advanced Disc Toolkit (ADT) from Advanced Computer Products (reviewed in *The Micro User*, February, 1986, Page 51) which provides these essential ADFS utilities together with *CATALL and others, thus avoiding the hassle of having to use the Welcome disc.

I look forward to other companies providing utility ROMs with committed ADFS facilities.

Like all good surgeons it didn't take me long to get into the guts of my Master and start to look around the circuit board with its impressive paucity of chips. Before you fit any ROMs type *ROMS and you will see:

```
ROM F TERMINAL 01
ROM E VIEW 04
ROM D Acorn ADFS 50
ROM C BASIC 04
ROM B Edit 01
ROM A ViewSheet 02
ROM 9 DFS 02
ROM 8 ?
ROM 7 ?
ROM 6 ?
ROM 5 ?
ROM 4 ?
ROM 3 ?
ROM 2 ?
ROM 1 ?
ROM 0 ?
```

This shows the ROM-based firmware, terminal, View, the ADFS, Basic4, the editor, ViewSheet and the Acorn DFS version 2.2, already fitted in the form of the 128k Mega-ROM, as seen in Figure VII.

The positions of the three empty ROM sockets at the front right-hand side of the circuit board are also shown in Figure VII. The middle of these, IC27, is configured to accept only 16k ROMs or eproms, for example 27128 eproms, and this counts as ROM number 8 in priority. Table II summarises the availability of access to ROMs and RAM with priority 0 to 8.

Perversely ROM socket 7 (IC 37) lies just behind socket 8 on the circuit board and ROM socket 5 (IC 41) just in front. When you receive the Master from the dealer these two sockets either side of the middle one are configured for 32k of RAM each, which is located elsewhere on the board and is already fitted as part of your 128k, so they will not accept ROMs or eproms.

Provided you are prepared to trade off the loss of 32k RAM per socket each may be configured to accept 16k ROMs or eproms by resetting neighbouring links.

Figure VII shows link LK 19 just to the left, and controlling the function, of socket 7 (IC 37). Similarly link LK 18 lies just by the top left-hand corner of, and controls, IC 41 (socket 5) – don't confuse it with link LK 12 immediately in front.

If these links are set with their connectors to the right, and the spare pin showing on the left as in Figure VII, their respective sockets will accept 16k ROMs or eproms – with the connectors to the left, as in Figure VIII, these two sockets are disabled and ROMs with priority 4 to 7 are configured as internal RAM (2 × 32k).

Table II shows that ROM sockets 4 and 6 only exist as internal RAM. ROMs 0 and 1, and 2 and 3, are for the ROMs or eproms inserted via the two ROM cartridge sockets, through the two new ashtrays just behind the keypad.

But, as with the reference manual, I

BAUD [1 to 8]	RS432 serial port receive/transmit rate (7 = 9600).
NOBOOT	Normal Break and Shift+Break functions.
BOOT	Reverses these key functions.
NOCAPS	Caps Lock off.
CAPS	Caps Lock on.
SHCAPS	Shift Lock on.
DATA [0 to 7]	RS432 data format (usually leave at default, 4).
DELAY n	Set delay before keyboard auto-repeat starts (n = delay in secs/100).
NODIR	Initialise ADFS without directory set.
DIR name	Initialise ADFS with selected directory.
INTUBE	Use internal co-processor (if fitted).
EXTUBE	Use external second processor (if fitted).
FDRIVE [0 to 3]	Set disc controller according to disc drive type. 0 = fast disc head control – double density compensated. 1 = fast – no DD compensation. 2 = intermediate. 3 = slow. Most modern drives can cope with fast setting and this can speed up disc access considerably and reduce clicking noises from disc drive.
FILE n	Default filing system in ROM socket n (built in ADFS = 13 or DFS = 9).
FLOPPY	ADFS accesses floppy disc drive on initialisation.
HARD	ADFS accesses Winchester disc on initialisation.
IGNORE [0 to 255]	Set Ascii value to be ignored by printer (if no value set all characters sent) (10 = ignore line feed – LF).
LANG n	Set ROM socket number of default language (14 = View, 12 = Basic, 10 = ViewSheet).
MODE [0 to 7,128 to 135]	Start-up in normal or shadow modes.
TUBE	Use second or co-processor.
NOTUBE	Ignore second or co-processor.
QUIET	Half volume bell.
LOUD	Full volume bell.
PRINT n	Set default printer (n = 0 for sink, 1 for parallel, 2 for serial). Sink is useful if you do not have a printer fitted since it prevents programs from hanging up if a printer is expected but not found.
REPEAT n	Set rate of keyboard auto-repeat (n = gap between repeats in secs/100).
SCROLL	Usual automatic line-feed of cursor as last character on line is typed.
NOSCROLL	Prevents this.
TV n,1	n = 256 to 252 moves entire screen window down 0 to 3 moves entire screen window up.

*Table I: CMOS RAM commands set with *CONFIGURE parameter*

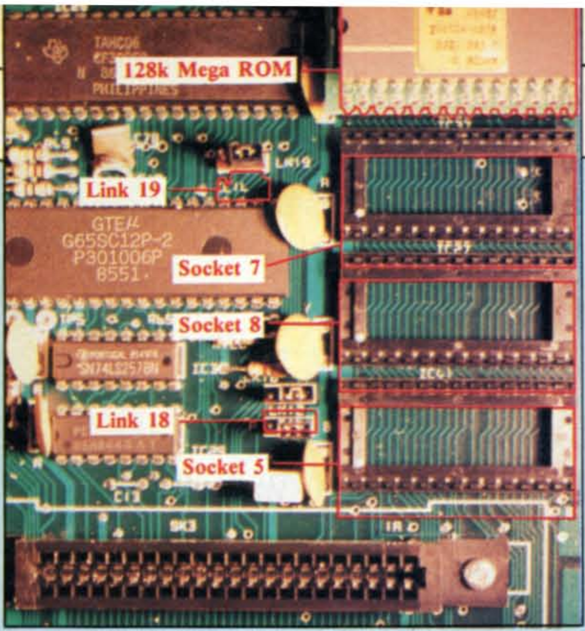

Figure VII: How the ROM sockets are laid out

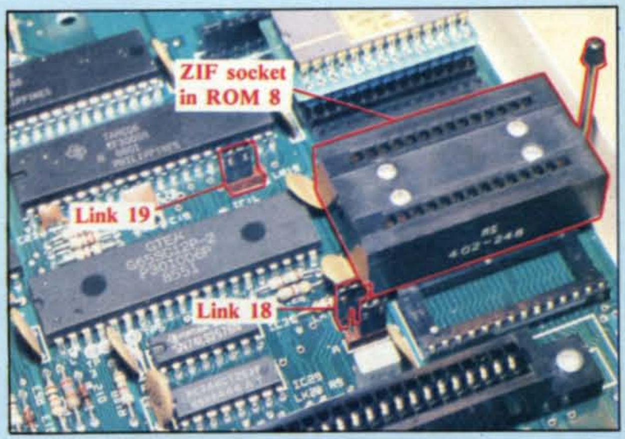

Figure VIII: ZIF socket in ROM slot 8

am still waiting for my empty user ROM cartridges to arrive. This is the only way I will be able to use my existing 8k (2764) eproms. Each cartridge will hold two 8k, 16k or 32k ROMs.

In the meantime my own solution is to only use socket 8 for eproms, and so leave the maximum amount of internal RAM accessible, and to fit a zero insertion force (ZIF) socket bought from RS Ltd into this middle socket where it lies nicely as in Figure VIII, and allows ROMs to be changed with the minimum of trauma to both the chips and me.

This means the lid of my new Master is, like the model B before it, destined never to be screwed down – perhaps for the better in view of those jumbo self-tap screws. When you are fitting ROMs don't forget the chips in the Master are all orientated left to right, instead of front to back as on the old BBC, so the notch in the end of the chip must be to the left.

Half of the Master 128's memory is configured as 4 × 16k RAM available as ROM priority numbers 4 to 7 as seen in Table II, provided your links are set appropriately. If you have software on disc which is in a ROM format this is easily loaded into internal RAM with the command:

```
*SRLOAD filename 8000 n
```

where n = the ROM number you wish to load to, which must be between 4 and 7. You must then press Ctrl+Break to initialise the ROMs and RAM areas. *HELP or *ROMS will show you if the software has been successfully loaded.

You can similarly save the contents of these RAM areas by:

```
*SRSAVE filename 8000+4000 n
```

Using this method you can, of course, load your 8k eprom software into RAM provided it resides on disc first.

One of the best hardware buys I have made in the last three years has been a Watford Electronics Eprom Programmer which enables me to do this and to put Basic and machine code programs in to a format which will run in RAM or eprom.

For example, I used the programmer software to construct a file to run in the ROM filing system which contains the Panel and Copyfiles utilities from the Welcome disc – they fit exactly into the 27128 16k format without a byte to spare. I load this file from disc to RAM with *SRLOAD and then can call them at will by:

```
*ROM
CHAIN"COPYFILES"
```

or

```
*RUN PANEL
```

Remember the Master's RAM does not have a write-protect switch, so commercially protected firmware designed to run in eprom which writes to, and so corrupts, itself will not work in RAM. I chose to upgrade from my model B because my old machine was nearing the end of its days and was groaning under the weight of ROM and RAM boards. Compatibility between these add-ons from different manufacturers was being stretched to the limit. Occasional major crashes did occur and my secretary would threaten to leave if she lost any more of her work.

Should you buy one? Your decision will depend on the features you want in a computer. The Master will appeal to the more serious user rather than the games player, particularly with the prospects of the future co-processors designed to plug into it.

I wanted a more powerful machine and double-density disc storage with on-going compatibility with all my existing work, programs, files and interface projects.

The Master was just what I was waiting for – shame about the price.

● *Next month I will take a closer look at the ADFS in action and how to make the most of the built-in text editor and View.*

ROM socket	ROM configuration		RAM configuration
8	16k ROM		none
7	16/32k ROM		16k RAM
6	none	OR	16k RAM
5	16/32k ROM		16k RAM
4	none	OR	16k RAM
3 2	upto 2 ROMs 8/16/32/128k rear cartridge		none
1 0	upto 2 ROMs 8/16/32/128k front cartridge		none

Table II: Memory configuration of RAM and ROM sockets 0 to 8

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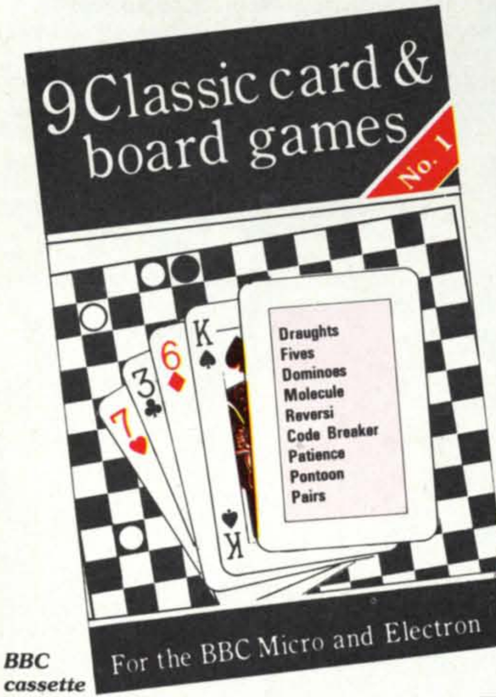

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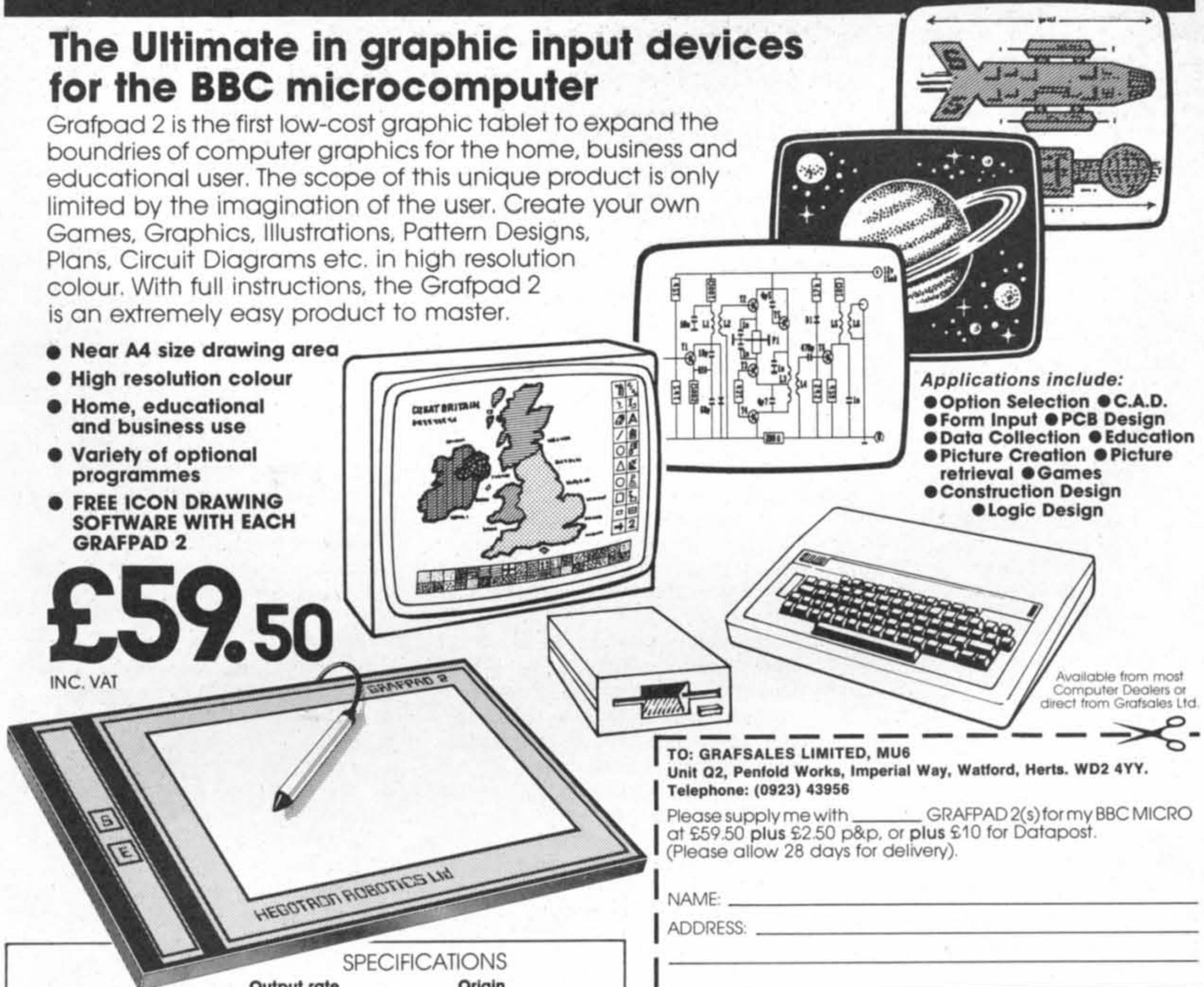

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Light on those eprom blowers and erasers

An appraisal of the market by JIM NOTMAN

MOST commercial ROM software that you buy is on eproms – erasable programable read only memory. They are just like any other ROM in that they can store programs and data.

What makes them different is that like tape or disc they can be erased and new programs written on to them. However extra equipment is required to do this.

The memory of an eprom is erased by exposing it to strong ultra violet light for several minutes which places logic 1s in all bits. When blank, new programs can be written to or "blown" on to the eprom with a special programmer.

The blower does this by giving a high voltage when writing the data, placing logic 0s in all the bits written to. This programming voltage is different for the various types of eprom available.

There is also another type of eprom around, the electrically erasable read only memory or eeprom. These are not so common, as they tend to be more expensive than the standard variety. Only one of the eprom blowers, the M423, could handle these.

SUPPLIERS

- ATPL, Station Road, Clowne, Chesterfield S43 4AB. Tel: 0246 811585.
- CTL, Unit 11, Burmash, Marsden Street, London NW5 3JA. Tel: 01-482 2177.
- Ground Control, 4 Alfreda Avenue, Hullbridge, Hockley, Essex SS5 6LT. Tel: 0702 230324.
- HCR Electronics, Bakers Lane, Ingatestone, Essex CM4 0B2. Tel: 0277 355407.
- IFEL (Interface Electronic & Computing Ltd), 36 Upland Drive, Plymouth, Devon PL6 6BD. Tel: 0752 787058.
- Softlife, 87 Silvertown Way, London E16 4AH. Tel: 01-474 0330.
- Technomatic, 17 Burnley Road, London NW10 1ED. Tel: 01-208 1177.
- Viglen Computer Supplies, Unit 7, Trumpers Way, Hanwell W7 2QA. Tel: 01-843 9903.
- Watford Electronics, 250 Lower High Street, Watford. Tel: 0923 37774.

There is a great sense of achievement the first time you write an eprom to use the paged ROM system. It doesn't need to be machine code. Even Basic programs can be put on to ROM if they are in the format used by the ROM filing system. This is especially useful if you've only got a cassette and want to be able to load a program quickly.

More and more people now want to blow their own eproms. There is a considerable range of programmers, both in terms of cost, from about £20 to more than £100, and the facilities they offer.

The main types of eproms used in the BBC Micro are from a series with 27 starting the number. The remainder of the number corresponds to the number of bits present in kilobits. To convert to kilobytes simply divide by 8.

The two most common types are the 8k 2764 and the 16k 27128. BBC B+ and Master owners will also want the ability to blow the 32k eprom, the 27256.

The BBC Micro, with its superb interfacing ability, makes an excellent base for programming eproms for other computers.

Whatever type of eprom programmer you require, I would advise getting one with a zero force insertion (ZIF) socket. This type of socket has a lever which is moved to make the contacts either grip the legs of the eprom tightly or to release them.

While in the released position an eprom can be dropped in or removed from the socket easily. This prevents the legs from being damaged, an all too common occurrence when using normal sockets.

There is also a third type, better than standard sockets, but not so good as ZIF, known as Low Force Insertion sockets.

An 8k eprom will normally take about six or seven minutes to program. Some software has the ability to program at a much faster speed, maybe only taking 90 seconds. If you are only going to blow the occasional eprom the speed will not matter too much, but if you are doing a lot of development work fast programming could save a lot of time.

Eprom programmers can be connected to the BBC Micro in two ways. The simplest is through the user port which, as well as the data lines, has a power supply.

A slightly more complex method is to use the 1MHz bus. There is no power outlet at this socket, so power is got either from the auxiliary power socket (as long as there is nothing else plugged in there already, like a disc drive) or through a built-in power supply from the mains.

As well as a blower you will need an eprom eraser. Until relatively recently these have been rather expensive, being more suited to commercial applications.

EPROM PROGRAMMERS

Name	Eproms blown	Voltages available	Fast prog	Connections	Socket	Software	Cost
ATPL Autoprom	All 27 series Most 25 series	12.5 21/25	Yes	1MHz bus Aux power socket	LIF	Tape or disc ROM £5 extra	£115
Technomatic Epromer II	All 27 series	12.5 21/25	Yes	1MHz bus Integral power	ZIF	Disc ROM £11.50 extra	£113.85
Ifel	2764 27128	21	No	User port	ZIF	Eprom	£34.15
Softlife	2764 27128	12.5 21	Yes	User port	ZIF	Eprom to transfer to disc or tape	£75.90
Viglen	2764 27128 27256	12.5 21/25	Yes	1MHz bus Integral power	ZIF	Disc	£79.95
Watford Electronics	2716 2516 2732 2532 2764 2564 27128	21/25	Yes	1MHz bus Integral power	ZIF	Eprom	£79.35
Watford Electronics Low Cost DIN	2716 2732 2532 2764 27128	21/25	Yes	User port	ZIF	Eprom	£56.93
CTL M423	All 27 series Up to 27128 Most 25 series	21.5 21/25	Yes	1MHz bus Integral power	ZIF	Eprom	£109.25
HCR Micron	2716 2532 2732 2764 27128	21/25	Yes	User port	ZIF	Tape for normal program area or sideways RAM	£54.48
Ground Control Uviprom 1	2764 27128	21	Yes	User port	DIL	Disc ROM £5 extra, case not included	£20.95
Ground Control Uviprom 2	2764 27128	21	Yes	User port	ZIF	Disc ROM £5 extra, case not included	£25.95

Now there are some designed for hobbyists.

They wipe any data off the eprom so that it can be reprogrammed. Ultraviolet (UV) light can damage your eyes, so the lamp should be totally enclosed, or have a switch so that if the unit is opened it will automatically switch itself off.

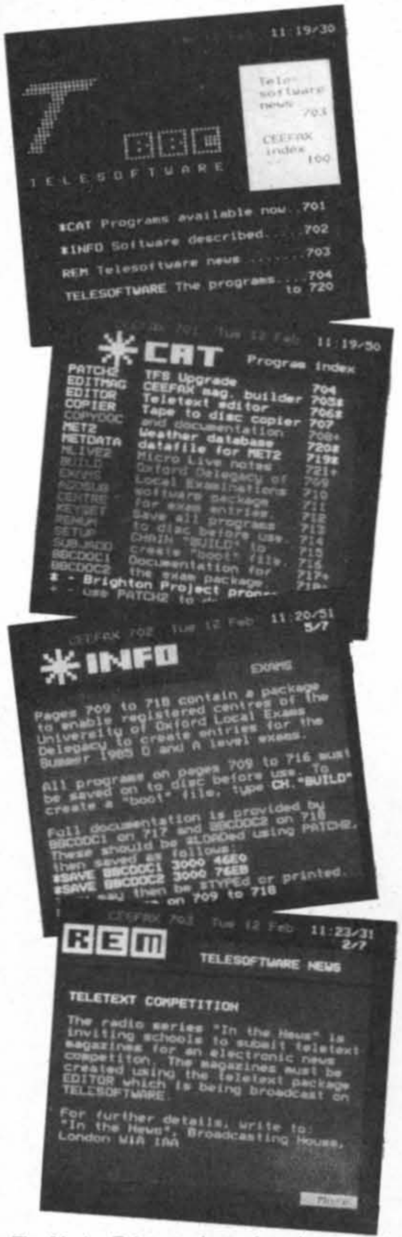
Too much exposure to UV can damage eproms. The time involved to erase one varies in relation to the intensity of the UV, but an average time would be about 10 to 15 minutes.

I found that it's best to have a built-in timer, especially if you have a bad memory.

EPROM ERASERS

Name/Manufacturer	Capacity	Features	Cost
Tex Eraser EB Watford Electronics	16		£32.20
Tex Eraser GT Watford Electronics	28	Safety cut out	£34.50
UV1B Technomatic	5	Safety cut out	£54.05
UV1T Technomatic	5	As above with timer	£67.85
Uvipac Ground Control	3		£21.45
Uvipac (T) Ground Control	3	Timer	£26.46
Uvipac (TS) Ground Control	3	Timer and alarm	£28.45

MORLEY ELECTRONICS



```
                                   11:19/30
                              Tele-
                              software
                              news
                                    703

                              CEEFAX
                              index
                                    100
T E L E S O F T W A R E

*CAT Programs available now..701
*INFO Software described.....702
REM Telesoftware news........703
TELESOFTWARE The programs....704
                           to 720
```

```
                                 11:19/50
*CAT      Program index
PATCH2    TFS Upgrade
EDITMAG   CEEFAX mag. builder    704
EDITOR    Teletext editor        705#
COPIER    Tape to disc copier    706#
COPYDOC   and documentation      707
MET2      Weather database       708+
METDATA   datafile for MET2      720#
MLIVE2    Micro Live notes       719#
          Oxford Delegacy of     721+
          Local Examinations     709
          software package       710
          for exam entries.      711
          Save all programs      712
SETUP     to disc before use.    713
          CHAIN "BUILD" to       714
          create "boot" file.    715
BBCDOC1   Documentation for      716
BBCDOC2   the exam package.      717+
# - Brighton Project progr...
+ - use PATCH2 to ...
```

```
CEEFAX 702  Tue 12 Feb  11:20/51
                              5/7
*INFO                  EXAMS

Pages 709 to 718 contain a package
to enable registered centres of the
University of Oxford Local Exams
Delegacy to create entries for the
Summer 1985 O and A level exams.

All programs on pages 709 to 716 must
be saved on to disc before use. To
create a "boot" file, type CH."BUILD"

Full documentation is provided by
BBCDOC1 on 717 and BBCDOC2 on 718.
These should be *LOADed using PATCH2,
then saved as follows:
*SAVE BBCDOC1 3000 46E0
*SAVE BBCDOC2 3000 76EB
They may then be *TYPEd or printed.
          on 709 to 718
```

```
CEEFAX 703  Tue 12 Feb  11:23/31
                             2/7
REM            TELESOFTWARE NEWS

TELETEXT COMPETITION

The radio series "In the News" is
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magazines for an electronic news
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EDITOR which is being broadcast on
TELESOFTWARE.

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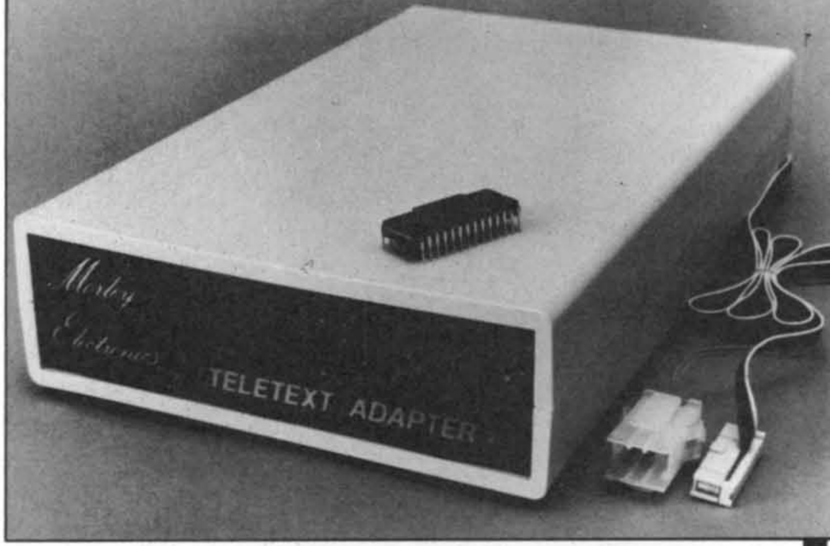
```



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Qty. ☐ Teletext software on Disc	@ £23.95 inc. VAT & P&P.	Qty. ☐ Utils ROM	@ £18.95 inc. VAT & P&P.
Qty. ☐ M/B DESIGN7 screen designer	@ £8.95 inc. VAT & P&P.	Qty. ☐ Eprom Programmer V.1	@ £18.95 inc. VAT & P&P.
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Arcade action from ROBIN NIXON

THE year is 2036. After decades of endeavour Man has built his first space base – in the asteroid belt. The belt, rich in minerals and ore, is being mined to replenish Earth's dwindling stock.

Space Base is the mineral storage depot for long-haul cargo ships to Earth. It also allows the mining ships to re-fuel and gives their crews a chance for well earned rest.

However, hostile alien craft from the Andromeda galaxy are also mining the belt and will stop at nothing to prevent any competition from Earth.

As Base Commander, your task is to defend the base from attack using its four laser guns.

The aliens often come in waves, so be careful not to let your laser overheat during an attack or you will not be able to use it until it has cooled down.

Disc users should download the program before running it.

Good luck Commander! You're going to need it.

PROCEDURES

gun(COL%,N1%)	Draws or erases laser at a position decided by *N1%*. *COL%* is the laser's colour.
alien(COL%,P%	Draws or erases an alien at a position determined by *P%*. *COL%* is the colour of the alien.
alien2(COL%)	Used by PROCgameover1 to draw aliens all over the screen in different colours.
attack	Checks whether an alien already exists in a certain position. If there is no alien one is put there.
shoot	Checks each position for an alien. If there is one there, and it has not fired a missile, PROCinitbomb is called to get one going. If a missile has been fired it is moved on by one position.
initbomb	Sets a missile going from a position determined by *N%*.
hit	Called to produce an explosion and to reset the missile when a missile hits the base.
movelazer	Checks the Z and X keys to see whether laser needs to be rotated left or right.
keys	Checks the Return key in case a laser beam has to be fired. Disabled two-switch users can play this game if they have switches connected to the two fire buttons of the joystick port. Switch one rotates the laser clockwise, and switch two fires the laser.
gameover1	Covers the screen with aliens.
gameover2	Displays score and high score.
instructions	Displays instructions.
recharge	Recharges shields every 10,000 points.
bonus	Gives a bonus depending on shields remaining after each attack wave.

PROGRAM STRUCTURE

200	Dimensions arrays and sets initial high score.
210-220	Display instructions, define envelopes and set up major variables.
230-280	Define user-defined characters.
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330-390	Main control loop.

Full listing starts on Page 110

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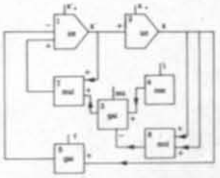

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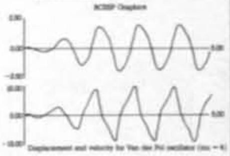

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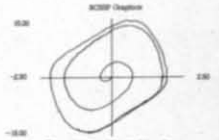

Phase plane plot of Van der Pol oscillator (mu = 4, x horizontal, x' vertical)

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IAN WHITMORE reviews Pagemaker+ and Fleet Street Editor

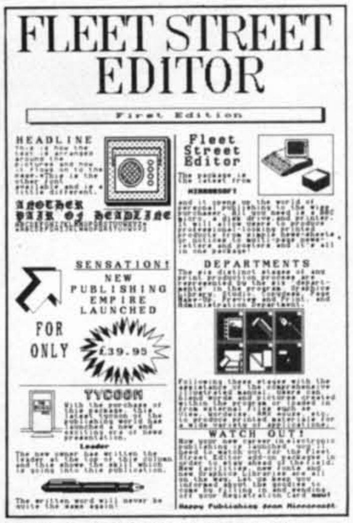
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Figure I: A full page print out using Fleet Street Editor

HAVE you ever wanted to compete with Eddie Shah, Rupert Murdoch or Robert Maxwell in publishing newspapers? Two software houses writing for the BBC Micro have taken up the challenge and produced packages with newspaper layout in mind.

Mirrorsoft has presented us with Fleet Street Editor and Advanced Memory Systems of AMX fame has produced Pagemaker+. Both support B and B+ Micros – but neither with the Tube – and allow you to use windows and icons to design and print A4 size pages which mix graphics and text.

In both suites of programs most of the action takes place on a large screen using cursor movements and icons contained in the margins.

Fleet Street Editor comes in a neat red ring binder containing a 146 page A5 manual, key strip and two discs. You must buy the system in 40 or 80 track discs – no converter is supplied and the discs are protected so no back-up is possible.

After a brief introduction a section on computing and publishing jargon is followed by a chapter on system set-up. Single or double sided and/or dual disc drives and printer type are selected and saved on the system disc. Standard disc formatting is explained and a formatter is supplied for B users.

Product: Pagemaker+
Price: £49.95
Supplier: AMS, 166-170 Wilderspool Causeway, Warrington WA4 6QA. Tel: 0925 413501

Product: Fleet Street Editor
Price: £39.95
Supplier: Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN. Tel: 01-377 4600

A guided introductory tour around the six departments of Fleet Street Editor occupies the next few pages of the manual and if followed culminates in the production of a full page printout (Figure I). Eleven pages follow on the publishing process in general and two pages on disc and file management and the use of joysticks.

Selection of each of the six departments is from the menu presented on booting the system disc (Figure II). The first is the Graphics Library which contains about 400 individual graphics pieces including illustrations, symbols, cartoons and text fonts. They are all printed out for reference in the appendix.

From the Graphics Library screen you use the icons present in the right margin of the screen to load pages of graphics from which individual symbols can be selected and saved on to the user disc.

The Studio allows you to create your own graphics from scratch or to modify others imported from other departments such as the Graphics Library.

Facilities available are load and save panel from or to disc, copy an area and enlarge or reduce it, flip it left or right and up or down, zoom edit, create black and white frames, boxes and circles and clear panel.

Various thickness pens in normal, italic, cruciate and parallel line styles are selected from the icons below the screen. Eight different fill patterns can also be used. This department uses a twin screen technique, the front screen being normally visible.

The rear screen is hidden and only updated to the end of the previous front screen operation when a new operation is started. Four further icons allow you to force rear screen update, view the rear screen, overwrite the front screen with the rear screen and clear either screen.

In the Copydesk department you add text to your graphics to create a completed panel. Mirrorsoft obviously felt that as much screen area should be made available for data as possible as most options are selected by the use of normal and shifted function keys.

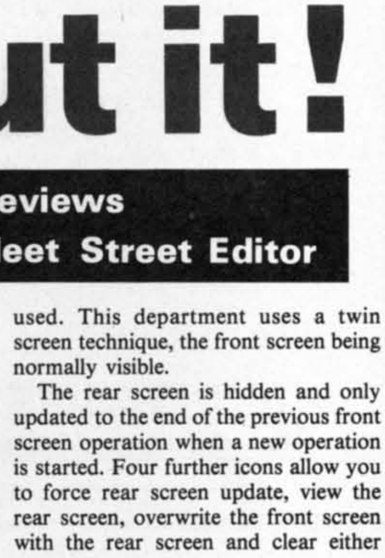


Figure II: The main menu icons

Text is added from the keyboard or imported from another text file, such as formed by Wordwise or View and graphics are loaded from disc. You can insert or overwrite, change fonts, create headlines, centre or right justify your text and even write in inverse text. Your text is intelligently handled, flowing around graphics and wordwrapping at line ends.

Panels created using the three

previous departments are now selected and arranged into pages in Page Make-up. You choose between two formats – eight panels in two columns of four or four panels in a single centre column.

A catalogue of your disc is displayed from which you must select panels to fill the spaces on the page. Each panel on the left side is offered as a double width panel in order to create banner headlines. At this stage no data is visible in the panels.

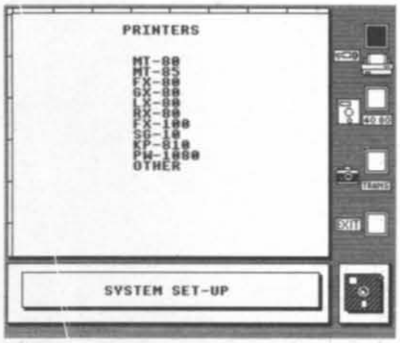
In the Printing department the made up pages are previewed and printed. The preview only enables you to identify the panels you have chosen. Three print options are available – standard, double pass high quality and reduced size condensed. The example in Figure I is the high quality type.

Last comes Administration where the set-up options were chosen earlier, such as disc drives, printer and so on. Should a printer not be supported – see Figure III – you can write your own printer driver using the in-built facility.

A formatter is included and also available is a transfer function which will convert non-Fleet Street Editor files, such as those from AMX Art or a digitiser, into FSE files. This also allows completed panels to be treated as graphics by the Studio.

The manual is well laid out and easy to read, each section having its own heading in the left column. The index is very good and the sections containing hints and tips, and data on duplication, publishing and file management on the BBC Micro are helpful.

AMX Pagemaker+ is supplied in a box containing two 16k eproms, two discs and a 94 page manual. The two eproms are inserted in any sideways ROM sockets. However I found that when I had one on the main BBC board and one on my ATPL ROMboard the program hung up. Putting both on the main board cured the problem.



```
PRINTERS

MT-80
MT-85
FX-80
GX-80
LX-80
RX-80
FX-100
SG-10
KP-810
PW-1080
OTHER

SYSTEM SET-UP
```

Figure III: The system set-up screen

The two discs are supplied in 40 track format but can be converted to 80 track using a program on the system disc. It is possible to back-up both system and font discs, except the main program on the backed-up system disc will not work.

The manual has a few introductory pages which give advice on compatibility and on the discs needed to store pages, fonts, screens and cutouts. It is essential to reserve a disc exclusively for pages.

Booting the system disc loads the first title screen – Figure IV – from which you can opt to use a joystick by pressing Fire. The default allows use of a mouse and/or keyboard.

The second screen, containing the credits, is followed by the main menu (Figure V) from which you can select one of the four components of Pagemaker. These are Set-up, Definer, Processor and Preview.

Set-up provides selection of sound on or off, foreground and background colours, screen position and printers (even drawing the correct printer on the screen). The printers supported are almost the same as those for Fleet Street Editor.

Also available in Set-up are a mode converter to enable the conversion of screens in non-Pagemaker format to be converted for use in Pagemaker and a special page disc initialiser.

The Definer is similar to the icon designer of previous AMX fame, except that it allows the definition of 91 characters which are available to the main part of Pagemaker as a font.

Each character is selected from the display area, moved into the defining window and then altered by pressing Execute with the pointer over a particular pixel.

There are options for flipping right or left and up or down. 18 fonts are supplied on the font disc and all can be altered and resaved or new fonts designed from scratch. Using Definer you can create patterns as well as characters.

The most important module is the Processor in which all the text and graphics manipulation takes place. Page has a special meaning in Pagemaker as the software has been written to allow an area of the page disc to be used as an extension of the BBC Micro's memory.

This means that as you scroll the processor up or down the page the invisible part is saved on disc. The screen is scrolled using the up and down arrow icons in the right margin.

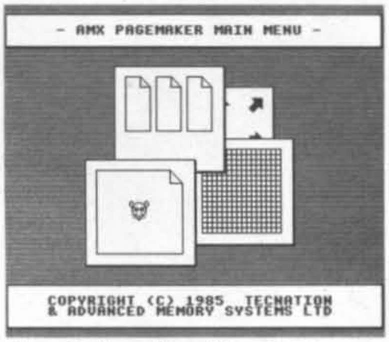
Other margin icons control the quick click window, filing, cut and paste facilities, text fonts and layout, graphics, windows, printing and a selection of goodies. With each of these icons a submenu appears in the top margin.

AMX
pagemaker

Figure IV: Pagemaker – The title screen

Cut and Paste allows defined areas of screen to be saved, reloaded, stretched, shrunk, rotated, flipped left or right and up or down and zoom edited. The text facilities resemble a word processor, accepting files of text imported from Wordwise or View or simply typed in on the keyboard.

Justification, centring, altering size of character or space and loading of different fonts are all supported. The graphics facilities are similar to those in AMX SuperArt. You can spray, paint, use patterns and shapes and place symbols or characters from the font store.



```
- AMX PAGEMAKER MAIN MENU -

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```

Figure V: Pagemaker – The main menu

A 3D Aid is included to help in losing those lines that would be hidden in 3D

→

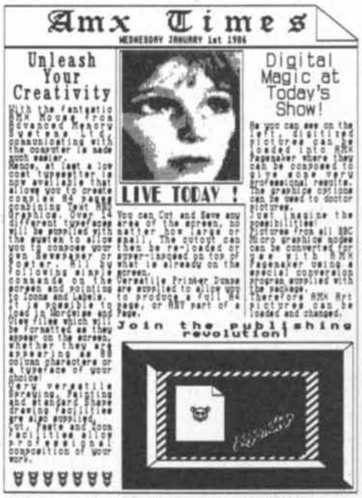
From Page 91

constructions. In the Goodies routine are sound on or off, interlace on or off, access to star commands and 3D Zicon files and a programmable gridlock.

The latter provides a user programmable grid on which lines and such are drawn, thus making technical drawing easier.

The Quick Click Window is always available within any other routine and is an easy way of changing colour of paint, inverting the screen, making shapes have dotted or joined edges and hollow or solid interiors, and altering the spray size and intensity. This window, which also switches the gridlock on and off, announces the current page name and date.

If you select the Printer icon you can print out a page, screen or window in three A5 and two A4 size printouts. These vary in their quality and speed. In Figure VI the practice page supplied with Pagemaker+ is printed out with the largest and highest quality dump on an Epson LX80 printer.



Amx Times

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Figure VI: A full screen printout using Pagemaker+

The manual is clear and simple, providing all information necessary to use Pagemaker+, except an index. Although a smaller manual might be arranged logically so that an index is unnecessary a suite of programs of the complexity of Pagemaker+ must be accompanied by a manual with an index.

There are only a few differences between the two packages. Fleet Street Editor is a stand alone program, portable from computer to computer, whereas Pagemaker+ is eprom dependent and would thus be expected to remain in one machine.

Fleet Street Editor demands more thought in designing pages as each one is made up of separate panels. Pagemaker+ allows more flexibility in design because each page is accessible directly from the processor. However in order to make the best use of Pagemaker+ you really need a mouse, which almost doubles the price.

All in all these two superb packages are both well worth their cost and neither have any strong drawbacks.

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MU 6/86

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Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such as telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).

Only applies to users outside the 01-London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 18p per 100 (N. America); £1.25 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.

Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Telemessages can be sent with an illustrated greetings card for 65p extra.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

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Take the right trail for good adventuring..

BACK in the Dark Ages, when Uncle Clive was exhorting everyone to run their own atomic power stations, I splashed out on a ZX81, and in due course bought myself a massive 16k RAMpack together with a book on how to type in your own programs.

One of these was called an adventure game – and it looked very different from all those jerky shoot 'em up or ski 'em down types of game.

For something like five hours I plodded away entering the listing, noted the warning to save the program before attempting to run it, set up the recorder and triumphantly pressed the save area of the membrane – a little too enthusiastically – as it turned out. I joggled the RAMpack, and wiped the lot.

A couple of days later I did it all again, successfully this time, and by now I was mildly interested. Later I bought a Spectrum, and found some games by Artic (remember them?) and the acquaintance was deepened a little.

However it was not until I had a BBC Micro on order that I happened to wander behind the scenes one day at Microtest. There I found two of the lads staring at a screenful of print, arguing quietly.

They were using part of their lunch break to look at a new game. I peered over their shoulders and was transfixed – a whole new world of rich descriptions and evocative atmospheres was unveiled before my eyes.

I looked, thought, and tentatively offered a suggestion. "Have you thought of letting the bird out of the cage?" I asked. Drop Bird was typed in ... and blow me down if the snake wasn't scared off.

"You done this sort of thing before?" one muttered. "Not really", I admitted, "but I want to if this is the sort of thing you've got in stock".

And so I became one of Level 9's earliest customers. I must have been one of the few people to buy a program before having a micro to run it on. Mad as a Hatter!

"Tie you up for weeks, if not months", was their parting shot, as I finally made my way home – and so it proved the case.

Since then I've had students and professors squabbling in my study over Philosophers Quest, a Bishop banjaxed by Colossal Adventure, and more fun than I ever thought possible.

by
The Mad Hatter
10/6

In this column I want to introduce newcomers to the adventure genre, run a hint and tips section – do send in hints as well as requests for help – and review games as they come out. That's if my predecessor, Alice, has left any undone.

I shall be glad to have as much feedback from you as possible, particularly from those who have thought about trying adventures but have not quite got around to starting.

Similarly, those who have got stuck in the early stages of their first or second purchase can often get deterred when often it's just a question of overcoming a blind spot to reach a successful conclusion – cheering elves or whatever.

Experienced players grit your teeth while I give some hints about choosing a good adventure game. Firstly, while reviews are useful they are by their very nature one person's opinion, however objective they may try to be.

Thus while I have enjoyed most of Level 9's offerings I didn't enjoy the Silicon Dream trilogy as much as their more traditional games, and I am still waiting impatiently for Sue Gazzard to bring out a successor to Lords of Time.

So, don't take reviews as the last word. I may rave over a game, you buy it through mail order, give it a whirl and think I'm potty.

The best technique by far is to try the game yourself, either by borrowing it from a friend (don't rip it off – that kills the goose that lays the golden eggs), or trying it at a shop that will let you have a reasonable test-drive. Shops that won't do this don't deserve your custom.

Here are some of the things to look for. What sort of information comes with the packaging? Is there a reasonable attempt to give a story line, some background information that will enable you to get into character easily? Don't confuse this with hype designed to sell a game to any passing mug.

How big is the game? While not an infallible guide, usually the bigger the better.

A personal quirk here – are there pictures on the BBC Micro version? I prefer the text-only games, though I might change my mind if we see ones specially designed for second processor use, the BBC+ or the new Master series.

Twin Kingdom Valley wasn't bad, but I prefer to create my own mental images of what is there from good, evocative text descriptions. Perhaps that is why I still listen to radio more than I watch TV.

How does the game react when you

→

From Page 95

get fed up or merely want a fresh start?

Type in Quit. Is there a prompt asking if you really mean it? If you then type in Yes and the game is scrapped, think very hard before buying it. If it's a tape you've just faced yourself with the possibility of a five to seven minute wait while you load afresh.

Good programmers provide a second prompt such as "Do you want another game?" Only if you then type in No should the game be dumped.

Next look at the early locations and their descriptions. Is the atmosphere suggested on the cassette insert or whatever maintained? Is it a believable start in the sense that it is consistent?

Do the first few descriptions fire your imagination? This is a sign that a good story line has been turned into a game that should grip you for many hours to come.

Another important pointer to the quality of a game is the business of a backup help service. How does the screen respond when you type in Help? What you should be looking for is some sort of meaningful clue, or a "send off for a clue sheet" message.

Acornsoft provides a sealed envelope with its games and this provides most clues you'll need.

Level 9 provide clue sheets on request and Magus will answer individual queries. Both require an sae.

Incidentally, I totally endorse Alice's comments in the March issue of *The Micro User* – Magus is an excellent game and will delight any experienced adventurer.

It's also a good one for beginners, and this is something of a rare quality – so many beginners adventures are childish.

You can visit at least 100 locations before you have to get serious about solving puzzles, and this makes it ideal for first-timers.

Unlike Alice, I managed to score a couple of hundred points in the first hour or two of play (not sure how to thumb my nose in print).

This is one game you can only get by mail order at present – the address is Magus, 4 Toronto Close, Durrington, Worthing, W. Sussex BN13 2TD and the cost £9.95 – worth every penny.

Finally, see what happens if you type in odd prompts – not so much to test for reaction to rude words, rather to see how it responds to typographical errors of the sort we all make from time to time.

Does it have the ability to respond to the command EXAMINE (almost mandatory these days), can you repeat an action, can you enter complicated instructions? All of these are indicators of the quality of the game. Long gone are the days when TAKE BOOK satisfied everyone.

Next month I shall deal with starting an adventure – the sort of early moves to try, and how to plan a campaign.

I'll use one or more of the classic games for examples of the things to look for and how to cope with the kind of puzzles you can expect in the initial stages of a good adventure.

Till then, happy adventuring.

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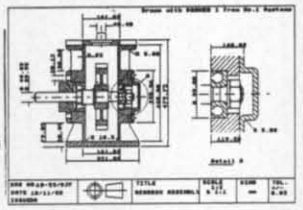

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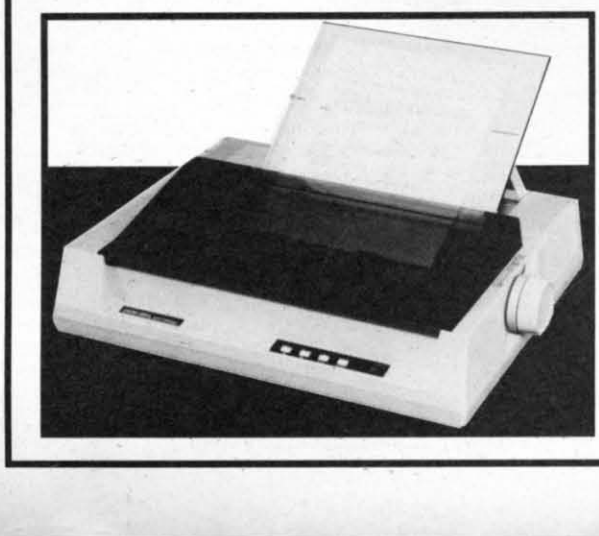

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Way into the world of satellite telemetry

MIKE COOK
reviews the Astrid telemetry package

ASTRID stands for Automatic Satellite Telemetry Receiver and Information Decoder and it lets you enter the world of satellite telemetry by providing you with a satellite earth station. To put it another way, it's a VHF radio and some signal conditioning circuitry.

Surrey University has placed two satellites in low earth orbit by hitching a lift on a commercial flight. UOSAT 1 (University Of Surrey SATellite) was launched by NASA in October 1981.

I remember listening to the first pass on my amateur radio equipment. On the third pass they turned the telemetry on and I was able to see what was happening on board.

To do that I needed a lot of equipment. I constructed most of it myself, but if I had purchased it all the cost would have been nearly £1,000, whereas with Astrid and your computer you can do the same for just over £100.

UOSAT 1 was in such a low orbit that it was expected to last only two years. However five years later it is still going strong.

In March 1984 UOSAT 2 was launched in a slightly higher orbit. As both satellites use the same frequency for their main telemetry channel the same equipment can be used. In fact there is a slight difference in the way the data is sent but Astrid can cope with both.

The data from UOSAT is in nearly the same form as used by the BBC Micro for its cassette storage. That is asynchronous data with tones of 1200Hz and 2400Hz representing logic zero and ones.

In the Astrid package you get an antenna, power supply, test tape, the receiver/decoder, and all the leads are supplied. The receiver/decoder is basically a VHF radio receiver operating at a frequency of 145.825 MHz.

There is also a circuit to convert the audio tones into zeros and ones to send to the computer via its serial port. When Astrid hears anything it turns on a relay.

You can use this to record the audio signals and later play them back through Astrid and feed them into your computer. This is useful for night time passes for those of you without babies to wake you up every 90 minutes.

The aerial is a simple dipole about a metre long and should be placed as high as possible, clear of obstructions. It is omnidirectional, which means you don't have to move it to track the satellite as it traverses the sky.

However, this type of aerial gives you the lowest gain. You can get a high gain aerial from an amateur radio supplier which gives you a stronger signal but you have to organise some way of making it point at the satellite as it goes past.

The better the aerial the more of the pass you will be able to receive. The test tape contains some data recorded directly from the satellite complete with crackles and noise. It also contains some simple receiving software to allow you to display the raw data coming down.

UOSAT makes an orbit of the earth every 90 minutes or so. Therefore you might expect to be able to pick it up on every orbit. However as it is so low it does not always appear above our horizon.

This is not because the satellite moves but because we do. Owing to the rotation of the earth we have moved about 24 degrees each orbit. This means there are only about six orbit passes a day when we can see the satellite.

On three of these the satellite appears to travel from south to north – we say these are ascending orbits. On the other three passes the Earth has turned half a revolution so that the satellite appears to be travelling from north to south – this is a descending orbit. Of course the satellite does not change direction – it's just that we are facing the other way round.

Both UOSATs are in a special type of orbit that is known as sun synchronous. This means that when crossing the equator on an ascending orbit it is always the same local time directly under the satellite and the passes we can see will be at roughly the same time each day.

At the moment for UOSAT 2 the ascending passes are in the afternoon and the descending passes are in the early hours of the morning. If you know the exact time of one equator crossing it is quite simple with the aid of the computer to work out the times of all the passes for a few weeks.

There is an automatic recorded message updated weekly with the latest orbital data on telephone number Guildford (0483) 61707 for UOSAT 1 and Guildford (0483) 61202 for UOSAT 2.

The best orbits are those which pass directly overhead because you will hear the satellite for the maximum length of time which is about 10 minutes.

Other passes where the satellite does not rise so high will be shorter. The simplest way is just to leave Astrid in automatic mode and wait for it to record something. If you know the position of the satellite in the sky you could track it with more directional aerials.

Having recorded the telemetry what should you expect to see? Well, UOSAT can transmit information that has been sent up from Earth. In which case you will see plain text giving orbital data and the latest news on the satellite experiments.

In this mode it is just acting as a simple one way communication satellite. The other mode is the transmission of telemetry frames.

A frame is simply a set of numbers. Each number has two parts to it, one to identify the channel and the other the value in the channel. Each channel is sending a measurement from an experiment or housekeeping system monitors.

To make sense of this you have to know what each channel is allocated to. Unfortunately this is not given in the Astrid documentation, but addresses where you can obtain the information are.

That is not the end of the story. The value of each channel is encoded so you have to pass each number through its own formula to get the real reading.

There are two types of channels, analogue and status. The analogue channels give a reading and the status give an on or off indication. A friend of mine, Martin Moss, wrote a program to get this raw data and convert it into a readable form, a frame of analogue and status telemetry as shown in Figures I and II.

You can see the wide range of information from systems and experiments. When a parameter has an X, Y or Z against it it indicates the axis of the face of the box-like satellite where the measurement was taken.

The minus sign indicates the opposite side of the box.

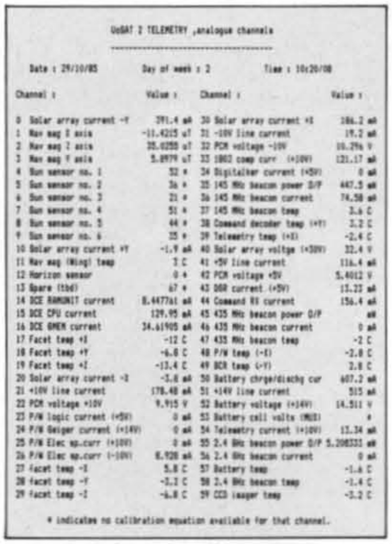
The solar cells are of prime importance and an indication of their output tells you whether the satellite is in shadow.

Incidentally, when they made UOSAT 1 they got the solar cells quite cheaply as they had not been space tested. That is, the design had never been used in space before. However, the UOSAT 2 solar cells cost a great deal more because they had been space tested – by UOSAT 1.

Generally, system voltage, current, power and temperature take up the bulk of the channels with Geiger counters and magnonometers making up the bulk of the experiments.

On the status side there is a space dust experiment, part of which is a microphone picking up the sound of microscopic meteorite collisions and counting them.

As you are picking up the data live some things such as temperature will not vary much during a pass but when looked at over many passes a trend can be revealed. Sometimes the output of a few sensors are recorded over a whole orbit and then transmitted back to Earth on the next orbit.



```
              UoSAT 2 TELEMETRY ,analogue channels
              ------------------------------------

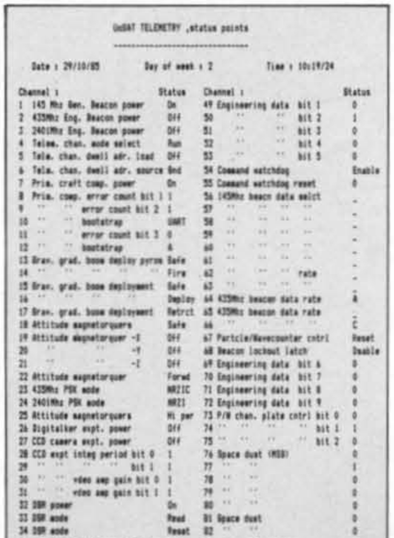
  Date : 29/10/85          Day of week : 2          Time : 10:20/08

Channel :                   Value :  Channel :                      Value :

0  Solar array current -Y     391.4 mA 30 Solar array current +X     186.2 mA
1  Nav mag X axis        -11.4215 uT 31 -10V line current            19.2 mA
2  Nav mag Z axis         35.0255 uT 32 PCM voltage -10V           10.296 V
3  Nav mag Y axis          5.8979 uT 33 1802 comp curr  (+10V)     121.17 mA
4  Sun sensor no. 1            52 *  34 Digitalker current (+5V)        0 mA
5  Sun sensor no. 2            36 *  35 145 MHz beacon power O/P    447.5 mW
6  Sun sensor no. 3            21 *  36 145 MHz beacon current      74.58 mA
7  Sun sensor no. 4            51 *  37 145 MHz beacon temp           3.6 C
8  Sun sensor no. 5            44 *  38 Command decoder temp (+Y)     3.2 C
9  Sun sensor no. 6            35 *  39 Telemetry temp (+X)          -2.4 C
10 Solar array current +Y    -1.9 mA 40 Solar array voltge (+30V)    32.4 V
11 Nav mag (Wing) temp          3 C  41 +5V line current            116.4 mA
12 Horizon sensor               0 *  42 PCM voltage +5V            5.4012 V
13 Spare (tbd)                 67 *  43 DSR current (+5V)           13.23 mA
14 DCE RAMUNIT current  8.447761 mA  44 Command RX current          156.4 mA
15 DCE CPU current         129.95 mA 45 435 MHz beacon power O/P          mW
16 DCE GMEM current      34.61905 mA 46 435 MHz beacon current            0 mA
17 Facet temp +X              -12 C  47 435 MHz beacon temp              -2 C
18 Facet temp +Y             -6.8 C  48 P/W temp (-X)                  -2.8 C
19 Facet temp +Z            -13.4 C  49 BCR temp (-Y)                   2.8 C
20 Solar array current -X    -3.8 mA 50 Battery chrge/dischg cur    607.2 mA
21 +10V line current       178.48 mA 51 +14V line current             515 mA
22 PCM voltage +10V         9.915 V  52 Battery voltage (+14V)     14.511 V
23 P/W logic current (+5V)      0 mA 53 Battery cell volts (MUX)          *
24 P/W Geiger current (+14V)    0 mA 54 Telemetry current (+10V)    13.34 mA
25 P/W Elec sp.curr (+10V)      0 mA 55 2.4 GHz beacon power O/P 5.208333 mW
26 P/W Elec sp.curr (-10V)  6.928 mA 56 2.4 GHz beacon current            0 mA
27 facet temp -X              5.8 C  57 Battery temp                   -1.6 C
28 facet temp -Y             -3.2 C  58 2.4 GHz beacon temp            -1.4 C
29 facet temp -Z             -6.8 C  59 CCD imager temp                -3.2 C

     * indicates no calibration equation available for that channel.
```

Figure I: Analogue channels



```
                UoSAT TELEMETRY ,status points
                ------------------------------

  Date : 29/10/85          Day of week : 2            Time : 10:19/24

Channel :                          Status  Channel :                      Status
1  145 Mhz Gen. Beacon power         On    49 Engineering data  bit 1      0
2  435Mhz Eng. Beacon power          Off   50      ''        ''  bit 2      1
3  2401Mhz Eng. Beacon power         Off   51      ''        ''  bit 3      0
4  Telem. chan. mode select          Run   52      ''        ''  bit 4      0
5  Tele. chan. dwell adr. load       Off   53      ''        ''  bit 5      0
6  Tele. chan. dwell adr. source     Gnd   54 Command watchdog             Enable
7  Prim. craft comp. power           On    55 Command watchdog reset       0
8  Prim. comp. error count bit 1     1     56 145Mhz beacn data selct      -
9    ''    ''   error count bit 2    1     57   ''     ''    ''    ''      -
10   ''    ''   bootstrap            UART  58   ''     ''    ''    ''      -
11   ''    ''   error count bit 3    0     59   ''     ''    ''    ''      -
12   ''    ''   bootstrap            A     60   ''     ''    ''    ''      -
13 Grav. grad. boom deploy pyros     Safe  61   ''     ''    ''    ''      -
14   ''    ''    ''     ''     ''    Fire  62   ''     ''    ''  rate      -
15 Grav. grad. boom deployment       Safe  63   ''     ''    ''    ''      -
16   ''    ''    ''     ''           Deploy 64 435Mhz beacon data rate     A
17 Grav. grad. boom deployment       Retrct 65 435Mhz beacon data rate     -
18 Attitude magnetorquers            Safe  66   ''     ''    ''    ''      C
19 Attitude magnetorquer -X          Off   67 Particle/Wavecounter cntrl   Reset
20    ''          ''      -Y         Off   68 Beacon lockout latch         Dsable
21    ''          ''      -Z         Off   69 Engineering data  bit 6      0
22 Attitude magnetorquer             Forwd 70 Engineering data  bit 7      0
23 435Mhz PSK mode                   NRZIC 71 Engineering data  bit 8      0
24 2401Mhz PSK mode                  NRZI  72 Engineering data  bit 9      0
25 Attitude magnetorquers            Hi pwr 73 P/W chan. plate cntrl bit 0 0
26 Digitalker expt. power            Off   74  ''    ''     ''    '' bit 1 1
27 CCD camera expt. power            Off   75  ''    ''     ''    '' bit 2 0
28 CCD expt integ period bit 0       1     76 Space dust (MSB)             0
29  ''   ''    ''    ''   bit 1      1     77   ''    ''                   1
30  ''   ''  vdeo amp gain bit 0     1     78   ''    ''                   0
31  ''   ''  vdeo amp gain bit 1     1     79   ''    ''                   0
32 DSR power                         On    80   ''    ''                   0
33 DSR mode                          Read  81 Space dust                   0
34 DSR mode                          Reset 82   ''    ''                   0
35 Radiatn dtct Geiger-A EHT pwr     Off   83   ''    ''  (LSB)            1
36   ''     ''     ''  -B EHT pwr    Off   84 DSR write cycle complete     0
37   ''     ''     ''  -C EHT pwr    Off   85 1802 CMD output              0
38 Elctrn Spctrmtr snsr EHT pwr      Off   86 1802 Telemetry port (MSB)    1
39 DCE expt. power                   On    87   ''      ''     ''          1
40 DCE expt.                         Run   88   ''      ''     ''          1
41  ''   ''   PROM select            A     89   ''      ''     ''          0
42  ''   ''   CPU clock rate Mhz     0.9   90   ''      ''     ''          0
43 Nav magntmeter power              On    91   ''      ''     ''          0
44 Space dust expt power             On    92   ''      ''     ''          0
45 Status calibrate                  *     93   ''      ''     ''          0
46 BCR status                        0     94   ''      ''     ''          0
47 435Mhz beacn modultn selct        AFSK  95   ''      ''     ''          0
48 2401Mhz beacn modultn selct       AFSK  96   ''      ''     ''  (LSB)   0
```

Figure II: Status channels

Both UOSATs also have a speech synthesiser on board so sometimes you will hear the numbers being spoken. Of course this results in less data being collected on any one pass.

There is also a charge coupled device TV camera on board each satellite. Unfortunately, the one on UOSAT 1 has deteriorated and now is not operational. It only ever sent a few poor images down. As far as I know the one on UOSAT 2 has not been used as the transmission of an image would take longer than the average pass. However you would need more than Astrid to display these.

Given Astrid's price, its performance is adequate. I tested it from the top storey of a 140 foot building in the centre of Manchester with a clear view of the horizon.

Using the simple aerial supplied nothing could be heard until the satellite was about 30 degrees above the horizon. Even then the electrical noise from the traffic below prevented any data being correctly decoded.

However when we switched to a high gain directional six element aerial, data could be correctly received when it was over 30 degrees – about seven frames per pass. The information shown in the figures were recorded in this way.

Taking it home to an electrically quieter environment data could be received using the simple aerial when the satellite was over 30 degrees and with my eight element aerial could be tracked to the horizon.

The results clearly show the supplied aerial is barely sufficient, and perfect results should not be expected. In areas of high electrical noise you will get no results at all.

However you don't need the complexity of a fully steerable aerial. You could get equally good results by holding a high gain aerial and manually tracking it.

This is best suited to a group investigation where you could have one group moving the aerial and the other monitoring the data. You don't have to be too precise where you are pointing as on a six element aerial you have a band width of 30 degrees.

The reception and study of satellite telemetry is an interesting and educational activity. There are many aspects to be explored – you can look into orbital prediction, tracking, data reception and data interpretation. The mechanics of satellite orbits can be demonstrated in a solid and practical way.

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Thanks for the memory

MIKE COOK reviews the Aries B32 Board

Product: Aries B-32
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WHEN the Aries B20 was launched it was a revolutionary new concept, so much so that there was not even a name for it. It added extra memory that overlaid the screen memory allowing more space for programs.

We now call this shadow RAM. My B20 and I were inseparable until the arrival of the B32, which is a development of the same concept, but taken to its ultimate sophistication.

The point is that memory tends to come in chunks that are sized as powers of two. So the 20k needed for a shadow RAM is not easy to achieve in a small chip count. Much more economical is to use 32k, leaving 12k free which, rather than be wasted can be put to good use.

As well as shadow RAM the other sort of memory you can add to the BBC Micro is sideways ROM or RAM. This can't be used for Basic program storage but is used to hold languages, filing systems and utilities.

With 32k to play with, the Aries B32 can divide its resources between sideways and shadow RAM. In short you can have almost any combination.

For example you could use 20k for shadow RAM and 12k sideways RAM, or 16k of shadow RAM and 16k of sideways RAM, or even no shadow RAM and two 16k banks of sideways RAM. In addition to this, ROM based software is available to make good use of the sideways RAM.

The B32 consists of a 6in by 5in board with a 2in by 2¼in chunk cut away from one corner. It plugs into the 6502 microprocessor socket with one of those North Sea oil rig type sockets and so stands proud of the board. It contains all the memory and software ROM.

Fitting couldn't be simpler – just remove the 6502 from the main board, plug it in the B32 and then plug the B32 into the vacant 6502 socket.

While it is untrue to say I fitted it with one hand tied behind my back, I did do it while carrying Graham, my eight month old son, which amounts to the same thing.

The B32 takes control over the computer's memory map and re-arranges it. A side effect of this is that the priority of the ROM sockets is reversed, so you might have to juggle them around. It does this because it wants its driving software, contained in the B32, as top priority.

As the B32 is capable of configuring the computer in many different ways there is a command to show you how it is currently operating. This is the *STATUS command, and the display looks like this:

```
Current shadow RAM ............ 20k
Workspace page ............. dynamic
Start-up link .......................... on
Program/data RAM ... 26112 bytes
From: &1A00 to &8000
```

Although there are a lot of variables to understand it is all quite simple.

With the B20 the software always powered up with the shadow RAM enabled. There was a command to turn it off so you could run software that made direct access to the screen.

In my review of the B20 I said it would be nice if this was an option. With the B32, it is. There is a start-up link which can be used to set the power-up condition. From the status display you can see that it is currently set to switch in shadow RAM on switch on.

By adding an S to the end of the status command you get a list of your sideways ROM space and also what sideways RAM the B32 has added.

With up to two full 16k sideways RAMs you can use a variety of languages and utilities loaded from disc rather than have your machine cluttered up with ROMs. In addition to this software is built into the system to allow these sideways RAMs to be used as extended buffers.

A buffer is a queue that the computer uses whenever it wants to input or output data. For example when sending data to a printer the computer uses a short 75 character queue.

If the printer can't take the data fast enough the queue fills up and the computer hangs up until it can get its data into the queue. With a queue 16k long, most listings or printouts can be almost instantly dumped into the buffer, leaving the computer free to get on with other work.

The serial input and output buffers as well as the sound speech and keyboard buffers can also be extended in the same way.

Extending the serial input buffers should be useful for those wishing to write terminal emulators, as with 16k you should not have to worry about the buffer becoming full while you make disc access for file spooling.

Other commands in the B32 software allow you to manipulate shadow and sideways RAM. For example *XSWAP and *XMOVE allow you to move or swap areas of sideways RAM or shadow and screen RAM. This is useful for quickly switching between two displays or the simple saving of display memory to disc. You can also easily load sideways RAM with the *RLOAD command.

The B32 even has a self test facility to assure you that it is fully functional. If you are brutally minded you can *RKILL a ROM, which disables it. You can even disable the current language in which case the B32 has a minimal language to take its place.

It only has one command, *OSCLI, which passes what you type on to the operating system – Operating System Command Line Interpreter hence OSCLI – and allows you to have no language actually fitted in your computer but to load it down from disc as required. A system of software markers allows for the protection of sideways RAM to prevent it being overwritten.

The B32 manual, a 60 page A5 spiral-bound book, covers the operation quite comprehensively. One welcome aspect is the applications section which has examples of using the B32 written in Basic. For example there is the skeleton of a high-speed database system using the sideways RAM and a routine to load and save very long programs.

The B32 is constructed to the highest standards and, with its built in software, allows an unprecedented degree of flexibility in the configuration of your computer.

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- Display low memory areas.
- Load menu.
- Switch NFS off.
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As can be seen from just a few of the many commands this ROM is a useful addition to the SIDEWISE ROM board.

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Now meet X and Y, the accumulator's closest relatives

MIKE BIBBY helps make sense of machine code – Part 5

SO far in this series we've met two registers, or internal memory spaces, of the 6502. We encountered the A register or accumulator which is an eight bit register – that is, it can hold one byte – and the Program Counter (PC) which is a 16 bit, two byte register.

We've also seen that a machine code program is a sequence of bytes in memory, some bytes being the instruction codes and other bytes being the data for those instructions to work on. The PC always points to the next instruction to be done.

The accumulator tended to be our general workhorse register. We loaded it with values (LDA) and then copied these values into other locations with STA (for STore Accumlator).

Later on we'll meet all sorts of tricks you can do with the A register. For the moment though, I want you to make the acquaintance of two close relatives, the X and Y registers.

Both are eight bit, single byte registers, and just as we can load and store the A register, so we can load and store these registers. It won't surprise you to learn that the mnemonics for these operations are LDX, STX and LDY, STY.

Last month we saw that there were three ways you could load the A register.

Firstly you could load it with the data immediately following the opcode. The mnemonic for this is LDA # and its opcode is &A9 (the # is termed hash). So LDA # &41 would translate to:

A9 41

and its effect would be to load &41 – the Ascii for A – into the A register. We call this way of ordering things, where we specify data in the byte immediately following the opcode, immediate addressing. In other words the 6502 knows the address to get the data from is immediately after the opcode.

Secondly you could load the accumulator from a two byte address in memory. That is the two bytes specify, or "point at", the memory location whose contents you want copying into the accumulator. Its opcode is &AD, so:

LDA &7C00

translates into:

AD 00 7C

Notice that no hash is needed now, we've got a different opcode and we've given our two byte address lo byte, hi byte fashion.

This way of doing things is known as absolute addressing. We're giving the 6502 the whole or absolute address of the memory we're interested in.

Lastly we saw that, if our address is in zero page, we need only give the lo byte of the address – the different opcode shows that we are dealing with zero page, with a hi byte of &00 taken for granted. The opcode for a zero page LDA is &A5 so:

LDA 70

translates into:

A5 70

This form of addressing is known as zero page addressing. We could, of course, get exactly the same effect with:

LDA &0070

which gives:

AD 00 70

but this uses a byte more memory and is also slower.

A common beginners' trick is to miss out the hash, giving unintentional results. For instance:

LDA # &41

means load the accumulator with &41, whereas:

LDA &41

means load the accumulator with the contents of memory location &41. In the latter case heaven only knows what ends up in the accumulator – that depends on what's in address &41 to begin with.

Mnemonic	Immediate	Zero page	Absolute
LDA	A9	A5	AD
LDX	A2	A6	AE
LDY	A0	A4	AC

Table I: LoaD instructions

These three ways of getting hold of the data – we call them modes of addressing – work equally as well with LDX and LDY as they do with LDA. Table I summarises the opcodes.

Just as you could STA absolute or zero page, so you can use these two modes of addressing with STX and STY as Table II shows. (If you think about it, you'll see that storing a number immediately in the byte after the opcode is going to be of little use, so STA immediate doesn't exist.)

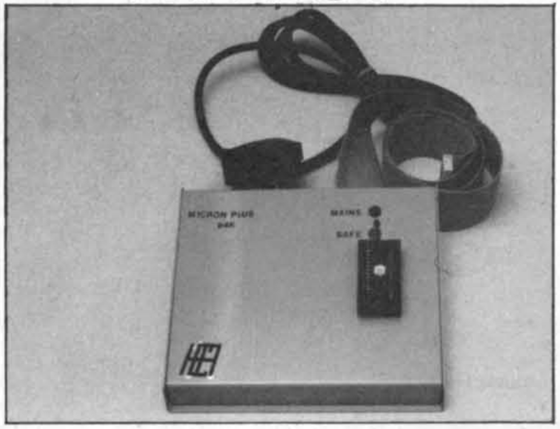
Right, we've talked enough theory, let's see how it works in practice. Program I should be easy enough to follow. It's stored at &2000. If you've done our usual trick of clearing screen to ensure a non-scrolled Mode 7, or used Hexer, the effect should be to give you an asterisk at the top lefthand corner of the screen. The program is an exact translation of last month's Program I, using the X register instead of A.

So when run, the X register is loaded

Mnemonic	Zero page	Absolute
STA	85	8D
STX	86	8E
STY	84	8C

Table II: Store instructions

AT LAST



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From Page 105

with the constant &2A, the Ascii hex for an asterisk. The X register is then stored at – that is, copied to – memory location &7C00, which the hardware interprets as the top lefthand corner of an unscrolled Mode 7 screen.

Now you understand how that works try Program II, its translation in terms of Y. I've left the opcodes for you to figure out for yourself. And you've to decide where to put it in memory.

```
Locations  Mnemonics   Opcodes
  2000     LDX #&2A    A2 2A
  2002     STX &7C00   8E 00 7C
  2005     RTS         60
```

Program I

The X and Y registers, as we'll see later, come in extremely handy as counters, often as loop counters. Of course, if you want to use them as counters you'll need to increase and decrease them even if only in steps of one. Hence the existence of INX, INY – INcrease X and Y respectively, and their DEcreasing counterparts, DEX and DEY. Table III gives the opcodes.

So, if X contains &41, X would contain &42 after INX, whereas after DEX it would contain &40.

Program III uses INX to put ABC on the unscrolled Mode 7 screen. We load the X register with &41 (Ascii A), then store it at &7C00 with STX &7C00.

```
LDY #&2A
STY &7C00
RTS
```

Program II

Next we INX so that our X register now contains &42 (Ascii B). We then STX at &7C01, INX to give us &43 (Ascii C) and store that at &7C02. It's as simple as ABC!

What I suggest you do is to translate it into Y register terms. That is, replace the INXs with INYs and the STXs with STYs.

Mnemonic	Opcode
INX	E8
INY	C8
DEX	CA
DEY	88

Table III: Stepping X and Y

And while you're at it, can you alter Program III so that you get CBA at the top of the screen instead of ABC? You'll want to use DEX I think. When you've done that, translate it in terms of the Y register.

```
Locations  Mnemonics   Opcodes
  2000     LDX #&41    A2 41
  2002     STX &7C00   8E 00 7C
  2005     INX         E8
  2006     STX &7C01   8E 01 7C
  2009     INX         E8
  200A     STX &7C02   8E 02 7C
  200D     RTS
```

Program III

By now you've probably thought: "We can increase X and Y, I'll bet you can increase A." Unfortunately you're wrong, and just about every 6502 programmer has had cause to regret this in his or her career. So INA and DEA don't exist.

However you can increase and decrease a memory location in steps of one with INC and DEC. Again, if it's a zero page location there's a special opcode for it, as Table IV shows.

To prove that INC works, try Program IV.

Once again we load the accumulator with &41 (A) and then store it at &7C00, the top left of the unscrolled Mode 7 screen. When it's there, we Jump to the SubRoutine (JSR) at &FFE0. This is the Osrdch routine which waits for a character from the keyboard, stores its Ascii value in the accumulator, and then returns.

Mnemonic	Zero page	Absolute
INC	E6	EE
DEC	C6	CE

Table IV: Stepping memory

In this case we're using it just to wait for a keypress and aren't too concerned about which key is pressed. As you can see, the accumulator plays no further part in the program.

```
Locations  Mnemonics   Opcodes
  2000     LDA #&41    A9 41
  2002     STA &7C00   8D 00 7C
  2005     JSR &FFE0   20 E0 FF
  2008     INC &7C00   EE 00 7C
  200B     JSR &FFE0   20 E0 FF
  200E     INC &7C00   EE 00 7C
  2011     RTS         60
```

Program IV

Once a key has been pressed and we've returned from Osrdch, we INC &7C00, so it's contents are now increased by one to &42. As this is the Ascii for B, the hardware dutifully puts a B on the screen, overwriting our previous A.

We again wait for a keypress with a JSR to Osrdch. When we get it we once more increment &7C00, which gives us &43 there which the hardware interprets as a C. We then return to whatever called us.

To summarise, the effect of the program is to put an A at the top left of the unscrolled screen then, following successive keypresses, overprint it with a B then a C. Can you rewrite it so that the keypresses take us from C down to A? You'll need to use DEC.

● *Right, that's all for this time. Next month we'll investigate increments further and look at the assembler.*

PROBLEM

IF I am listing or editing a Basic program on my model B the auto-repeat rate goes up and I get three or four characters on the screen from one key depression.

If the bug strikes while I am using a machine code program the graphics slow up but the sound output is faster. – G. O'Neill, Hampton.

SOLVED

Some chip is interrupting the computer when it should not. This could be due to rapid firing of the interrupt line or it being held permanently low.

Try removing the 7002 A/D chip, the serial 6850 and the user VIA, as the computer will work without these.

Other chips will stop the computer from working, so they must be substituted. These include the system VIA, the 6845 and the video ULA.

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```
29:CLS
  350 GCOL0,3:MOVE 0,1023:DRAW 1279,1023:DRAW 1279,963:DRAW 0,963:MOVE 0,0:DRAW 1279,0:DRAW 1279,64:DRAW 0,64:MOVE 0,92:DRAW 1279,92:MOVE 0,931:DRAW 1279,931
  360 FORX%=0TO1279STEP128:MOVE X%,1023:DRAW X%,963:MOVE X%,0:DRAW X%,64:NEXT
  370 VDU5:FORX%=0TO3:MOVEX%*128+4,1019:PROCbox(0,X%):GCOL0,1:MOVE X%*128+48,1004:VDU252:NEXT:GCOL0,2:FORX%=1TO5:MOVEX%*128+436,1000:VDUX%+48:NEXT:MOVE 1204,1000:VDU244
  380 GCOL0,2:FORX%=1TO4:MOVEX%*128-80,48:VDUX%+248:NEXT
  390 FORX%=1TO4:MOVEX%*128+432,48:VDUX%+239:NEXT:FORX%=1TO2:MOVEX%*128+950,48:VDUX%+244:NEXT
  400 X%=640:Y%=512:X1%=640:Y1%=512:X2%=640:Y2%=512:GCOL3,2:PLOT4,X%-16,Y%+12:VDU255:GCOL0,3:Y1%=512:N%=6:F%=1:R%=4:C%=2:BR%=0:BF%=0:EF%=0:EF1%=0:SF%=0:SF1%=0:CF%=0:CF1%=0:CF2%=0:BB%=0:FF%=0:WF%=0:MOVE BB%*128+4,60:X3%=0:Y3%=0:PROCbox(4,0)
  410 X5%=X%:MOVE (N%/2+3)*128+4,1019:PROCbox(4,0):MOVE C%*128+48,952:GCOL4,0:VDU94:GCOL0,C%
  420 REPEAT:P%=?&71*16:Q%=1008-?&72*32:A%=P%-X%:B%=Q%-Y%:IF ABS(A%)+ABS(B%)<48 OR Y%=992 OR Y%=36 F%=F%+1 ELSE F%=0
  430 IF (Y%=992 OR Y%=36) AND X%<>X5% F%=0:X5%=X%
  440 IF F%>(15-CF1%*14) F%=0:PROConoff
  450 GCOL3,2:PLOT4,X1%-16,Y1%+12:VDU255:GCOL0,C%:MOVE X%,Y%:X%=X%+A%/N%:Y%=Y%+B%/N%:IF Y%>915 Y%=992:X%=(P%+128) DIV 128*128-64:R%=4
  460 IF Y%<112 Y%=36:X%=(P%+128) DIV 128*128-64:R%=4
  470 IF EF%=1 AND Y2%<990 AND Y2%>64 AND R%=5 EF1%=1
  480 IF (Y2%<990 AND Y%>990) AND EF%=1 GCOL4,0:DRAW X2%,Y2%:PLOT69,X2%,Y2%:GCOL0,C%:EF1%=0
  490 IF (Y2%>64 AND Y%<64) AND EF%=1 GCOL4,0:DRAW X2%,Y2%:PLOT69,X2%,Y2%:GCOL0,C%:EF1%=0
  500 IF EF1%=1 GCOL4,0:DRAWX2%,Y2%:DRAW X%,Y%:GCOL0,C%:GOTO580
  510 IF SF%=1 AND Y2%<990 AND Y2%>64 AND R%=5 SF1%=1 ELSE IF (Y2%<990 AND Y%>990) OR (Y2%>64 AND Y%<64) AND SF%=1 SF1%=0
  520 IF SF1%=1 GCOL4,0:MOVE X%,Y%:DRAWX%,Y2%:DRAW X2%,Y2%:DRAWX2%,Y%:DRAW X%,Y%:DRAWX%,Y2%:DRAW X2%,Y2%:DRAWX2%,Y%:DRAW X%,Y%:GCOL0,C%:GOTO580
  530 IFBF%=1 AND R%=5 MOVE X%-16,Y%+12:VDUBR%:GOTO580
  540 IF CF%=1 AND Y2%<990 AND Y2%>64 AND R%=5 CF1%=1 ELSE IF (Y2%<990 AND Y%>990) OR (Y2%>64 AND Y%<64) AND CF%=1 CF1%=0
  550 IF CF1%=1 GCOL4,0:RR%=SQR(ABS(X%-X2%)*ABS(X%-X2%)+ABS(Y%-Y2%)*ABS(Y%-Y2%)):FORNN1%=0TO1:FORNN%=1TO31STEP4:MOVE X2%+RR%*A%(NN%,0)/100-16,Y2%+RR%*A%(NN%,1)/100+12:VDU253:NEXTNN%,NN1%:GCOL0,C%:GOTO580
  560 IF FF%=1 AND Y%>64 AND Y%<990 AND R%=5 PROCfill:GOTO580
  570 PLOTR%,X%,Y%:Y2%=Y%:X2%=X%
  580 GCOL3,2:PLOT4,X%-16,Y%+12:VDU255:GCOL0,C%:X1%=X%:Y1%=Y%
  590 UNTIL 0
  600 DEFPROConoff:IF X3%=X% AND Y3%=Y% AND WF%=0 ENDPROC ELSE X3%=X%:Y3%=Y%
  610 S%=(X%-64)/128:IFY%<>992 GOTO680
  620 IFWF%>0 AND S%<>9 MOVE 1156,1019:PROCbox(4,0):WF%=0
  630 IF S%<4 MOVE C%*128+48,952:GCOL4,0:VDU94:C%=S%:MOVE C%*128+48,952:VDU94:GCOL0,C%:GOTO890
  640 IF S%=9 WF%=WF%+1:MOVE 1156,1019:PROCbox(4,0):SOUND1,-15,120,1:IF WF%=2 WF%=0:VDU24,0;96;1279;927;:GCOL0,129:CLS:VDU26
  650 IF S%=9 GOTO890
  660 MOVE (N%/2+3)*128+4,1019:PROCbox(4,0):N%=(S%-3)*2:MOVE (N%/2+3)*128+4,1019:PROCbox(4,0):GOTO890
  670 GOTO890
  680 IFWF%>0 MOVE 1156,1019:PROCbox(4,0):WF%=0
  690 IFY%<>36 GOTO840
  700 IF S%<8 MOVE BB%*128+4,60:PROCbox(4,0) ELSE SOUND1,-15,120,1
  710 IF S%<8 EF%=0:SF%=0:CF%=0:BF%=0:FF%=0
  720  ON S%+1 GOTO 730,740,740,740,750,760,770,780,790,810
  730 BF%=0:GOTO830
  740 BR%=S%+249:BF%=1:GOTO830
  750 EF%=1:X2%=X%:Y2%=Y%:GOTO830
  760 SF%=1:X2%=X%:Y2%=Y%:GOTO830
  770 CF%=1:X2%=X%:Y2%=Y%:GOTO830
  780 FF%=1:GOTO830
  790 MOVE S%*128+4,60:PROCbox(4,0):*SAVE PICTURE 3700 7000
  800 MOVE S%*128+4,60:PROCbox(4,0):GOTO890
  810 MOVE S%*128+4,60:PROCbox(4,0):*LOAD PICTURE
  820 MOVE S%*128+4,60:PROCbox(4,0):GOTO890
  830 BB%=S%:MOVE BB%*128+4,60:PROCbox(4,0):GOTO890
  840 IF EF1%=1 GCOL3,2:PLOT4,X1%-16,Y1%+12:VDU255:GCOL0,C%:MOVE X2%,Y2%:DRAW X%,Y%:GCOL3,2:PLOT4,X%-16,Y%+12:VDU255:GCOL0,C%:X2%=X%:Y2%=Y%:GOTO890 ELSE IF EF%=1 R%=5:GOTO890
  850 IF SF1%=1 GCOL3,2:PLOT4,X1%-16,Y1%+12:VDU255:GCOL0,C%:MOVE X%,Y%:DRAW X%,Y2%:DRAW X2%,Y2%:DRAW X2%,Y%:DRAW X%,Y%:X2%=X%:Y2%=Y%:GCOL3,2:PLOT4,X%-16,Y%+12:VDU255:GCOL0,C%:GOTO890 ELSE IF SF%=1 R%=5:GOTO890
  860 IF CF1%=1 SOUND1,-15,50,1:GCOL3,2:PLOT4,X1%-16,Y1%+12:VDU255:GCOL0,C%:VDU24,0;96;1279;927;:MOVE X2%+RR%*A%(31,0)/100,Y2%+RR%*A%(31,1)/100:FORNN%=0TO31:DRAW X2%+RR%*A%(NN%,0)/100,Y2%+RR%*A%(NN%,1)/100:NEXT:CF2%=1
  870 IF CF2%=1 VDU26:X2%=X%:Y2%=Y%:R%=4:CF1%=0:GCOL3,2:PLOT4,X1%-16,Y1%+12:VDU255:GCOL0,C%:CF2%=0:ENDPROC
  880 IF R%=5 R%=4:F%=1:GOTO890 ELSE R%=5:F%=0
  890 SOUND1,-15,100*R%-450,1:ENDPROC
  900 DEFPROCbox(BC%,CC%):GCOLBC%,CC%:PLOT0,116,0:PLOT81,-116,-54:PLOT0,4,0:PLOT0,116,0:PLOT81,0,54:ENDPROC
  910 DEFPROCinitcircle:DIMA%(32,1):X%=0:FOR A=PI TO PI*3 STEP PI/16:A%(X%,0)=SIN(A)*100:A%(X%,1)=COS(A)*100:X%=X%+1:NEXT:ENDPROC
  920 DEFPROCfill:Y4%=Y%:BC%=POINT(X%,Y%):IF BC%=C% ENDPROC ELSE GCOL0,BC%+128:PROCmiddle(4):PROCmiddle(-4):MOVE X%,Y%:R%=4:SOUND1,-15,120,1:ENDPROC
  930 DEFPROCmiddle(DD%):Y4%=Y%:PLOT77,X%,Y%:Z1%=!&314 MOD &10000*4:Z2%=!&310 MOD &10000:REPEATX4%=Z1%+(Z2%-Z1%)/2:MOVE X4%,Y4%:PLOT77,X4%,Y4%:Z1%=!&314 MOD &10000*4:Z2%=!&310 MOD &10000:Y4%=Y4%+DD%
  940 UNTILPOINT(X4%,Y4%)<>BC% OR Y4%>927 OR Y4%<96:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 145.

From Page 87

```
  100 REM *********************
  110 REM *                   *
  120 REM *    SPACE BASE     *
  130 REM *                   *
  140 REM *  By Robin Nixon   *
  150 REM *                   *
  160 REM * (c) The Micro User *
  170 REM *                   *
  180 REM *********************
  190 REM
  200 DIMAL%(4),SH%(4),DX%(4),DY%(4),
F%(4),G%(4),P%(4),FX%(4),FY%(4),FX1%(
4),FY1%(4):HS%=1000
  210 MODE7:VDU23;8202;0;0;0;:PROCins
tructions:MODE1:VDU23;8202;0;0;0;:FL3
%=0:FL4%=0:LZ%=220:SC%=0:EG%=288:ENVE
LOPE1,1,-14,8,16,14,6,0,0,3,-1,-4,126
,126:ENVELOPE2,1,-3,-8,-8,6,11,52,0,1
,-2,-1,126,126
  220 ENVELOPE3,1,-9,27,2,3,4,6,0,2,-
1,-1,126,126:LV%=50:SCN%=1:AN%=1:TSC%
=0:RLF%=0:FL5%=0
  230 VDU23,224,255,255,255,255,255,2
55,255,255,23,225,127,63,31,15,15,31,
63,127,23,226,254,252,248,240,240,248
,252,254,23,227,0,129,195,231,255,255
,255,255,23,228,255,255,255,255,231,1
95,129,0,23,229,15,31,63,127,255,255,
255,255
  240 VDU23,230,240,248,252,254,255,2
55,255,255,23,231,255,255,255,255,127
,63,31,15,23,232,255,255,255,255,254,
252,248,240,23,233,255,126,60,24,0,0,
0,0,23,234,128,192,224,240,240,224,19
2,128
  250 VDU23,235,1,3,7,15,15,7,3,1,23,
236,0,0,0,0,24,60,126,255,23,237,24,2
4,60,24,126,24,255,129,23,238,3,10,42
,254,254,42,10,3,23,239,192,80,84,127
,127,84,80,192
  260 VDU23,240,129,255,24,126,24,60,
24,24,23,241,153,90,36,219,219,36,90,
153,23,242,36,60,231,90,90,231,60,36
  270 VDU23,243,192,224,112,56,28,14,
7,31,23,244,0,0,0,0,60,126,195,129,23
,245,3,7,14,28,56,112,224,248,23,246,
31,33,67,219,219,67,33,31,23,247,255,
129,255,129,129,255,129,255,23,248,24
8,132,194,219,219,194,132,248
  280 VDU23,249,31,7,14,28,56,112,224
,192,23,250,195,195,126,60,0,0,0,0,23
,251,248,224,112,56,28,14,7,3,23,252,
138,36,81,132,81,202,53,66
  290 FORCC%=1TO200:SOUND1,1,CC%,1:GC
OL0,RND(3):PLOT69,RND(1279),RND(1023)
:NEXT:COLOUR2:FORY%=14TO18:FORX%=17TO
21:VDU31,X%,Y%:READA%:VDUA%:NEXTX%,Y%
:FORX%=1TO4:READP%(X%):NEXT:FORX%=1TO
4:READFX%(X%),FY%(X%),FX1%(X%),FY1%(X
%):NEXT
  300 FORX%=1TO4:PROCgun(0,X%):NEXT:P
ROCgun(3,1):DR%=1:VDU31,0,0:COLOUR131
:COLOUR1:PRINT" LASER ":COLOUR129:PRI
NTSTRING$(2,CHR$32);:COLOUR130:PRINTS
TRING$(5,CHR$32)
  310 VDU31,33,0:COLOUR129:COLOUR2:PR
INT" SCORE ";:COLOUR129:COLOUR3:VDU31
,0,30:PRINT" SHIELDS ":COLOUR130:PRIN
TSTRING$(9,CHR$32);:GCOL0,0:FORCC%=29
2TOEG%STEP-4:MOVECC%,0:DRAWCC%,31:NEX
T:VDU31,13,0:COLOUR131:COLOUR0:PRINT"
 SPACE  BASE ";
  320 COLOUR129:COLOUR130:VDU31,15,31
:PRINT" LEVEL ";:COLOUR1:PRINT;SCN%;C
HR$32;:COLOUR130:COLOUR1:VDU31,30,30:
PRINT" HI-SCORE ";:COLOUR128:COLOUR3:
VDU31,32,31:PRINT;HS%;:ZZ%=0
  330 PROCshoot:IFRND(20-SCN%*2)=1:PR
OCattack
  340 PROCkeys:VDU31,34,1:COLOUR3:PRI
NT;SC%
  350 LZ%=LZ%+1:IFLZ%>220 LZ%=220
  360 GCOL0,2:IFLZ%<64 GCOL0,1
  370 MOVELZ%,960:DRAWLZ%,988:IFTSC%>
9999 PROCrecharge
  380 IFAN%>LV% AND AL%(1)=0 AND AL%(
2)=0 AND AL%(3)=0 AND AL%(4)=0 PROCbo
nus:GOTO290
  390 IFEG%<1 PROCgameover1:MODE7:VDU
23;8202;0;0;0;:PROCgameover2:GOTO210
ELSE GOTO330
  400 DATA229,224,227,224,230,224,241
,224,241,224,225,224,241,224,226,224,
241,224,241,224,231,224,228,224,232,1
,3,4,2,622,604,622,870,508,496,170,49
6,736,496,1100,496,622,380,622,156
  410 DEFPROCgun(COL%,N1%):COLOUR129:
COLOURCOL%:ON N1% GOTO420,430,440,450
  420 VDU31,19,14,233:COLOUR128:VDU31
,19,13,237:ENDPROC
  430 VDU31,17,16,234:COLOUR128:VDU31
,16,16,238:ENDPROC
  440 VDU31,21,16,235:COLOUR128:VDU23
9:ENDPROC
  450 VDU31,19,18,236:COLOUR128:VDU31
,19,19,240:ENDPROC
  460 DEFPROCalien2(COL%):GOTO520
  470 DEFPROCalien(COL%,P%):COLOURCOL
%:COLOUR128:ON P% GOTO480,490,500,510
  480 VDU31,18,2:GOTO520
  490 VDU31,2,15:GOTO520
  500 VDU31,35,15:GOTO520
  510 VDU31,18,27
  520 COLOURCOL%:IFCOL%>0 COLOUR2
  530 VDU243:COLOURCOL%:VDU244:COLOUR
COL%:IFCOL%>0 COLOUR2
  540 VDU245,10,8,8,8:COLOURCOL%:VDU2
46:COLOURCOL%:IFCOL%>0 COLOUR1
  550 VDU247:COLOURCOL%:VDU248,10,8,8
,8:COLOURCOL%:IFCOL%>0 COLOUR2
  560 VDU249:COLOURCOL%:VDU250:COLOUR
COL%:IFCOL%>0 COLOUR2
  570 VDU251:ENDPROC
  580 DEFPROCattack:R%=RND(4):IFAL%(R
%)=1 ENDPROC
  590 AL%(R%)=1:SOUND1,1,0,2:PROCalie
n(3,R%):ENDPROC
  600 DEFPROCshoot:FORN%=1TO4:IF RND(
15-SCN%)=1 AND G%(N%)=0 AND AL%(N%)=1
 PROCinitbomb:GOTO680
  610 IFG%(N%)=0 GOTO680 ELSE DX%=DX%
(N%):DY%=DY%(N%):DX1%=DX%:DY1%=DY%:ON
 N% GOTO 620,630,640,650
  620 DY%=DY%+1:GOTO660
  630 DX%=DX%+1:GOTO660
  640 DX%=DX%-1:GOTO660
  650 DY%=DY%-1
  660 COLOUR0:VDU31,DX1%,DY1%,32:IFDX
%>16 AND DX%<22 AND DY%>13 AND DY%<19
 PROChit:GOTO680
  670 COLOUR1:VDU31,DX%,DY%,242:DX%(N
%)=DX%:DY%(N%)=DY%
  680 NEXT:ENDPROC
  690 DEFPROCinitbomb:SOUND3,3,50,5:G
%(N%)=1:ON N% GOTO700,710,720,730
  700 DX%(N%)=19:DY%(N%)=5:ENDPROC
  710 DX%(N%)=5:DY%(N%)=16:ENDPROC
  720 DX%(N%)=34:DY%(N%)=16:ENDPROC
  730 DX%(N%)=19:DY%(N%)=26:ENDPROC
  740 DEFPROChit:G%(N%)=0:SOUND0,-15,
5,4:FORCC%=1TO4:COLOURCC%:VDU31,DX%,D
Y%,252:PROCmovelazer:NEXT:PROCgun(0,N
%):PROCgun(3,P%(DR%)):EG%=EG%-8:GCOL0
,0:MOVEEG%,0:DRAWEG%,31:MOVEEG%+4,0:D
RAWEG%+4,31:ENDPROC
  750 DEFPROCmovelazer:FL%=0:IF(INKEY
(-67) OR (ADVAL(0)AND1)) AND FL3%=0 P
ROCgun(0,P%(DR%)):DR%=DR%+1:FL%=1:FL3
%=1:IF DR%=5 DR%=1
  760 IFINKEY(-98) AND RLF%=0 PROCgun
(0,P%(DR%)):DR%=DR%-1:FL%=1:RLF%=1:IF
 DR%=0 DR%=4
  770 IFNOTINKEY(-98) RLF%=0
  780 IF(ADVAL(0)AND1)=0 AND NOTINKEY
(-67) FL3%=0
  790 IFFL% PROCgun(3,P%(DR%))
  800 IFINKEY(-74)=0 AND (ADVAL(0)AND
2)=0 ENDPROC
  810 FL5%=1:IFLZ%>63 FL4%=0
  820 IFLZ%<1 LZ%=0:FL4%=1
  830 IF FL4% ENDPROC
  840 GCOL0,0:MOVELZ%,960:DRAWLZ%,988
:MOVELZ%+4,960:DRAWLZ%+4,988:LZ%=LZ%-
```

```
0:ZZ%=P%(DR%):PROCgun(3,ZZ%):GCOL3,2:
SOUND2,2,100,5:GCOL3,2:FORCC%=1TO4:MO
VEFX%(ZZ%),FY%(ZZ%):DRAWFX1%(ZZ%),FY1
%(ZZ%):NEXT
  850 ENDPROC
  860 DEFPROCkeys:PROCmovelazer:IFINK
EY(-74)=0 AND (ADVAL(0)AND2)=0 ANDFL5
%=0 ENDPROC
  870 FL5%=0:IFFL4% ENDPROC
  880 IFG%(ZZ%)=1 SOUND0,-15,6,5:G%(Z
Z%)=0:FORCC%=0TO3:COLOURCC%:VDU31,DX%
(ZZ%),DY%(ZZ%),252:PROCmovelazer:NEXT
:COLOUR 0:VDU31,DX%(ZZ%),DY%(ZZ%),252
:SC%=SC%+25*SCN%:TSC%=TSC%+25*SCN%:AN
%=AN%+1:PROCgun(3,P%(DR%)):ENDPROC
  890 IFAL%(ZZ%)=1 ZZ1%=ZZ%:SOUND0,-1
5,5,5:FORCC%=0TO4:PROCalien(CC%,ZZ%):
PROCmovelazer:NEXT:PROCalien(0,ZZ1%):
AL%(ZZ1%)=0:SC%=SC%+10*SCN%:TSC%=TSC%
+10*SCN%:AN%=AN%+1
  900 ENDPROC
  910 DEFPROCgameover1:FORZ%=1TO150:S
OUND1,1,RND(50)+50,1:VDU31,RND(37),RN
D(27):PROCalien2(RND(3)):NEXT:ENDPROC
  920 DEFPROCgameover2:FORCC%=0TO1:PR
INTSPC10CHR$141CHR$129CHR$157CHR$132"
SPACE BASE  "CHR$156:NEXT:PRINT'''CHR
$131"You scored ";SC%:IFSC%>=HS%:HS%=
SC%:PRINT''CHR$133"Which is the new h
igh score"
  930 PRINT''CHR$129"HI-SCORE ="CHR$1
35CHR$136;HS%
  940 PRINT'''SPC8CHR$134"Press SPACE
 to play"
  950 REPEATUNTIL(ADVAL(0)AND3)=0 AND
 INKEY(-99)=0:REPEATUNTIL(ADVAL(0)AND
3)>0 OR INKEY(-99):RESTORE:FORCC%=1TO
4:G%(CC%)=0:AL%(CC%)=0:NEXT:ENDPROC
  960 DEFPROCinstructions:FORCC%=0TO1
:PRINTSPC10CHR$141CHR$129CHR$157CHR$1
32"SPACE BASE"SPC2CHR$156:NEXT:PRINT'
'CHR$130"The object of this game is t
o defend"'CHR$130"your SPACE BASE fro
m all would-be"'CHR$130"invaders."
  970 PRINT'CHR$129"You have a laser
you can rotate by"'CHR$129"pressing t
he Z and X keys."''CHR$133"To fire th
e laser press RETURN."
  980 PRINT'CHR$134"Be sparing with y
our laser or it will"'CHR$134"overhea
t."''CHR$132"The game ends when your
SHIELDS have"'CHR$132"been destroyed.
":GOTO940
  990 DEFPROCrecharge:TSC%=SC%MOD1000
0:GCOL0,2:SOUND1,2,1,1:FORCC%=1TO100:
VDU19,0,RND(7),0;0;:NEXT:VDU19,0,4,0;
0;:FORCC%=EG%-4TO284STEP4:MOVECC%,0:D
RAWCC%,31:SOUND1,2,CC%,2:NEXT:EG%=288
:VDU19,0,0;0;:*FX15
 1000 ENDPROC
 1010 DEFPROCbonus:SC1%=((EG%DIV5)*10
*SCN%)/(EG%/4):GCOL0,0:COLOUR3:FORCC%
=EG%TO0STEP-4:MOVECC%,0:DRAWCC%,31:VD
U31,34,1:SC%=SC%+SC1%:PRINT;SC%:TSC%=
TSC%+SC1%:SOUND1,-15,200,1:FORZZ%=1TO
150:NEXTZZ%,CC%:LV%=LV%+25:SCN%=SCN%+
1:LZ%=220:AN%=1
 1020 SC1%=5-SC%MOD5:SC%=SC%+SC1%:TSC
%=TSC%+SC1%:VDU31,34,1:PRINT;SC%:CLS:
RESTORE:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 145.

TODAY'S ROMs

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ADE

The complete program development
package for assembly language prog-
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bler; a dynamic text editor; a front panel
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comes complete with a 160 page compre-
hensive reference manual and a utility/
macro library disc.

ASSEMBLER

The ASSEMBLER features macros with
library facilities; nestable conditional
assembly; flexible listing options (with or
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binary and ASCII data formats; dummy
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ops. Source and object files are kept on
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include local label BLOCK command, and
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Use with the 2nd processor for really
fast assembly.

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The EDITOR is designed with the prog-
rammer in mind for writing both programs
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very powerful command language (including
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done on a semi-automatic basis. It features
full screen editing and deferred edit modes;
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backup facilities and a versatile text
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Now includes 80 column mode when using the 2nd processor.

DEBUGGER

The DEBUGGER is instantly accessible for
inspecting, modifying and disassembling
machine code programs. Features include
full 64 byte display in hex, ASCII and
disassembled format; registers; stack;
single step; breakpoints; memory search
and much more.

Price £60 inc vat.
Please specify 40 or 80T utility disc.

SPY 2

SPY2 is a front panel debugging monitor,
disassembler and disc utility ROM. SPY2
is instantly accessible to the programmer
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SPY2 also features a relocator and program
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either in the sideways ROM sockets or on
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displayed, single-stepped through or dis-
assembled.

SPY2 includes a set of powerful disc
recovery commands for interrogating,
editing and retrieving data stored on a
floppy disc. SPY2 also includes a disc
formatter as well as a non-destructive
single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

EASY TO USE . . . . .

The SPY2 front panel encompasses all the
superb, easy-to-use facilities of the renown-
ed SPY debugging monitor PLUS additional
commands for toggling and finding break-
points; relocating machine code programs;
single stepping through subroutines in
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SPY2 features a versatile disassembler
with hex dump, full and intelligent dis-
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programs; these being displayed as a hex/
ASCII dump. Operating system calls are
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The powerful trace facilities enable program
instructions and register contents to be
traced to printer whilst the program is
running. Indispensable for graphics
programs as they can be stepped through
whilst observing the effects on the screen.

SPY2 features a disc sector editor dis-
playing the contents of a whole sector;
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directory entry with all the data concern-
ing the deleted file. Directory entries can
be easily amended using the *AMEND
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command checks discs. The *REFORMAT
command is extremely useful for recover-
ing information from a bad track, refor-
matting it and restoring the data.

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The most comprehensive of all debugging/disc utility ROMs.

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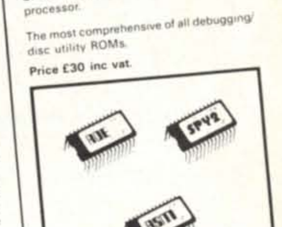

ASM

ASM provides all the superb features of
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The program source file may be written
using any editor (even Wordwise or View!).
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professional software writers use.

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SYSTEM. Note the definite

advanced micro-based music system on
the market. A powerful piece of software:
The package

From Page 75

PROCEDURES

play	The main game procedure.
all4	Flashes all four emeralds when a screen has been completed.
set	Decides the initial start positions of the yellow peril.
baddy	Checks what action is to be taken for a particular yellow peril.
re	Chooses the position that a yellow peril will reappear in after it has been expelled.
qu	Used by FNcmbad for randomising motion.
gotcha	Called if Polly is bitten by the yellow peril.
go2	Called by PROCgotcha to alternately display Polly and Yellow peril.
push	Called if Polly pushes a cube or an emerald.
bof(C%)	Removes a yellow peril when hit by a cube or emerald.
dis(i%)	Dissolves a cube that cannot move.
scor(x%,y%)	Calculates where an emerald has been pushed and increments *H%* as necessary.
hisc	Decides whether the high-score table is to be updated.
table	Prints the high-score table.
cong	Congratulates player for a high score and gets the player's name using OSWORD 0.
march	Makes Polly march across the screen.
head	Prints the title.
muon	Switches the background music on or off if M pressed.
mon	Displays the current score between lives.
out	Removes all three sprites used for Polly from the screen.
border	Displays the moving screen border and the secondary title sequence.
del (D%)	Delays procedure using TIME.
scn	Initialises the game screen.
wind	Sets up the text window used for the main game.
shscn	Prints the game screen.
ton	Restarts the background music.
geths	Recovers the initial high-score table after PROCshorten has taken effect by storing the high-score table in memory at &7700, then reading it back after the program has been shortened – this saves wasting program space with initial high-score table data.
code	Generates the machine code.
check (A%)	Checksum calculator. Double checksums are used on all data and code assembled.
confirm(error$)	Clears the screen and prints ***error$*** if the checksums do not tally.
slow(A$)	Prints ***A$*** with a teletype effect using an enlarged cursor.
banner	Prints the initial title screen on its first calling. On a disc system this procedure will be called twice – once before the program is downloaded to &E00 and once after. To prevent the procedure from acting twice the $ direction operators are used to detect the presence of a particular string on the Mode 7 screen.
shorten	The program shortening procedure.
oldrun	Places the tokens for OLD and RUN in the keyboard buffer using *FX138.
moveprog	Downloads the program to &E00 if PAGE is set higher than this.

```
   10 *FX3
   20 HIMEM=&7600
   30 IFTOP>&3000 PROCshorten ELSEPRO
Cgeths:MODE2
   40 PROCborder
   50 PROCtable
   60 REPEAT
   70 PROCscn
   80 PROCplay
   90 PROChisc
  100 UNTIL0
  110 END
  120 DEFPROCplay
  130 L%=FALSE:l%=4:s%=FALSE
  140 REPEAT
  150 X%=x%*J%+J%:Y%=y%*J%+K%
  160 B%(x%,y%)=1
  170 H%=FALSE:I%=1
  180 F%=FALSE:Z%=FALSE
  190 PROCset
  200 REPEAT
  210 IFF% F%=FNmobd(F%,C%):ELSEB%(x%
,y%)=FALSE:F%=FNkey:B%(x%,y%)=1
  220 PROCbaddy
  230 UNTILH%>3
  240 IFH%=4PROCall4:PROCscn
  250 UNTILH%=6
  260 ENDPROC
  270 DEFPROCbaddy
  280 LOCALT%
  290 Z%=(Z%-TRUE)MOD3:IFZ%>L%FORT%=0
TO50:NEXT:ENDPROC
  300 IFD%(Z%)D%(Z%)=D%(Z%)+TRUE:PROC
re:ENDPROC
  310 IFf%(Z%)f%(Z%)=FNmbad ELSEf%(Z%
)=FNcmbad
  320 ENDPROC
  330 DEFPROCre
  340 LOCALT%
  350 FORT%=0TO48:NEXT
  360 IFD%(Z%)ENDPROC
  370 LOCALx%,y%
  380 REPEAT
  390 x%=RND(16):y%=RND(12)
  400 UNTILB%(x%,y%)=0ORB%(x%,y%)=4
  410 B%(x%,y%)=Z%
  420 U%(Z%)=x%*J%+J%:V%(Z%)=y%*J%+K%
  430 u%(Z%)=x%:v%(Z%)=y%
  440 u1%(Z%)=FALSE:v1%(Z%)=FALSE
  450 f%(Z%)=1
  460 ENDPROC
  470 DEFFNmbad
  480 LOCALC%,I%
  490 C%=5+Z%:I%=1
  500 U%(Z%)=U%(Z%)+u1%(Z%)
  510 V%(Z%)=V%(Z%)+v1%(Z%)
  520 CALLP%,U%(Z%),V%(Z%),C%,I%
  530 =f%(Z%)+TRUE
  540 DEFFNcmbad
  550 LOCALu%,v%,b%
  560 B%(u%(Z%),v%(Z%))=FALSE
  570 u%=SGN(x%-u%(Z%))
  580 v%=SGN(y%-v%(Z%))
  590 IFu%ANDv%PROCqu
  600 u%(Z%)=u%(Z%)+u%
  610 v%(Z%)=v%(Z%)+v%
  620 b%=B%(u%(Z%),v%(Z%))
  630 IFb%=FALSE:ELSEIFb%=4SOUND&10,-
12,4,15ELSEIFb%>4v%(Z%)=v%(Z%)-v%:u%(
Z%)=u%(Z%)-u%:u%=FALSE:v%=FALSE ELSEI
Fb%=1PROCgotcha:=FALSE
  640 u1%(Z%)=u%*N%
  650 v1%(Z%)=v%*N%
  660 B%(u%(Z%),v%(Z%))=Z%+5
  670 =4
  680 DEFPROCqu
  690 IFRND(2)=1u%=FALSE ELSEv%=FALSE
  700 ENDPROC
  710 DEFFNmobd(F%,C%)
  720 I%=1
  730 IFNOTF%ANDF%<5:X%=X%+SGN(BX%-X%
)*N%:Y%=Y%+SGN(BY%-Y%)*N%
  740 F%=F%+TRUE:IFF%<FALSE F%=FALSE
  750 CALLP%,X%,Y%,C%,I%
  760 =F%
  770 DEFPROCgotcha
  780 LOCALT%,C%
  790 FORT%=1TO19
  800 C%=Z%+5
  810 SOUND&11,2,100,2
  820 PROCgo2
  830 C%=T%MOD3
  840 PROCgo2
  850 NEXT
  860 1%=1%+TRUE:IF1%=0H%=6
  870 IFH%<4PROCmon
  880 ENDPROC
  890 DEFPROCgo2
  900 CALLP%,X%,Y%,C%,I%
  910 PROCdel(3-6*(C%<3))
  920 ENDPROC
  930 DEFFNkey
  940 LOCALF%
  950 IFINKEY-99PROCpush
  960 IFINKEY-98C%=FALSE:F%=TRUE:IFx%
>0IFB%(x%+TRUE,y%)=FALSE F%=5:BX%=X%-
J%:BY%=Y%:x%=x%+TRUE:=F%
  970 IFINKEY-67C%=1:F%=TRUE:IFx%<17I
FB%(x%-TRUE,y%)=FALSE F%=5:BX%=X%+J%:
BY%=Y%:x%=x%-TRUE:=F%
  960 IFINKEY-73C%=2:F%=TRUE:IFy%<13I
FB%(x%,y%-TRUE)=FALSE F%=5:BX%=X%:BY%
=Y%+J%:y%=y%-TRUE:=F%
  990 IFINKEY-105C%=3:F%=TRUE:IFy%>0I
FB%(x%,y%+TRUE)=FALSE F%=5:BX%=X%:BY%
=Y%-J%:y%=y%+TRUE
 1000 PROCmuon
 1010 =F%
 1020 DEFPROCpush
 1030 LOCALX%,Y%
 1040 IFC%=FALSE X%=TRUE ELSEIFC%=1X%
=1
 1050 IFC%=2Y%=1ELSEIFC%=3Y%=TRUE
 1060 IFFNch(x%,y%,4)ENDPROC
 1070 SOUND&11,1,200,20
 1080 LOCALc%,I%,x1%,y1%,T%,x2%,y2%
 1090 x1%=(x%+X%):y1%=(y%+Y%)
 1100 i%=2:c%=B%(x1%,y1%)
 1110 x2%=x1%*J%+J%:y2%=y1%*J%+K%
 1120 CALLP%,x2%,y2%,c%,i%
 1130 REPEAT
 1140 IFFNch(x1%,y1%,0)SOUND&11,0,0,0
:SOUND&10,-15,6,4:PROCdis(i%):PROCsco
r(x1%,y1%):UNTILTRUE:ENDPROC
 1150 i%=1
 1160 PROCbaddy
 1170 FORT%=1TO2
 1180 x2%=x2%+X%*O%:y2%=y2%+Y%*O%
 1190 CALLP%,x2%,y2%,c%,i%
 1200 NEXT
 1210 B%(x1%,y1%)=FALSE
 1220 x1%=x1%+X%:y1%=y1%+Y%
 1230 B%(x1%,y1%)=c%
 1240 UNTILFALSE
 1250 DEFFNch(x%,y%,c%)
 1260 x%=x%+X%:y%=y%+Y%
 1270 IFFNch2 THEN=TRUE
 1280 IFc%=4IFB%(x%,y%)=8THEN=FALSE
 1290 IFc%=FALSE:IFB%(x%,y%)>4IFB%(x%
y%)<8PROCbof(B%(x%,y%)):=FALSE
 1300 IFB%(x%,y%)<>c%THEN=TRUE
 1310 =FALSE
 1320 DEFFNch2
 1330 IFy%<0ORy%>13ORx%>17ORx%<0THEN=
TRUE ELSE=FALSE
 1340 DEFPROCbof(C%)
 1350 LOCALX%,Y%,I%,c%
 1360 c%=C%-5
 1370 D%(c%)=100
 1380 SOUND&12,2,150,10
 1390 CALLP%,X%,Y%,C%,I%
 1400 s%=s%+50
 1410 ENDPROC
 1420 DEFPROCdis(i%)
 1430 IFi%<>2ORc%=8ORFNch2 ENDPROC
 1440 LOCALT%
 1450 FORT%=0TO8
 1460 i%=T%AND1
 1470 SOUND&10,-15,i%+4,2
 1480 CALLP%,x2%,y2%,c%,i%
 1490 PROCbaddy
 1500 NEXT
 1510 B%(x1%,y1%)=FALSE
 1520 s%=s%+5
 1530 ENDPROC
 1540 DEFPROCscor(x%,y%)
 1550 IFc%=8IFx%MOD17=0IFy%MOD13=0H%=
H%-TRUE:s%=s%+200:B%(x%,y%)=9:SOUND&1
1,4,100,10:SOUND&10,0,0,0:IFH%=4:L%=(
L%-TRUE):s%=s%+1000:IFL%>2L%=2
 1560 ENDPROC
 1570 DEFPROCall4
 1580 LOCALX%,Y%,x%,y%,C%,I%,T%
 1590 C%=8
 1600 FORX%=0TO17STEP17
 1610 FORY%=0TO13STEP13
 1620 x%=X%*J%+J%:y%=Y%*J%+K%
 1630 FORT%=0TO10
 1640 SOUND&11,4,T%*6+50,10
 1650 I%=2:CALLP%,x%,y%,C%,I%
 1660 PROCdel(15)
 1670 I%=0:CALLP%,x%,y%,C%,I%
 1680 PROCdel(15)
 1690 NEXT
 1700 PROCdel(50)
 1710 NEXT:NEXT
 1720 PROCdel(50)
 1730 ENDPROC
 1740 DEFPROCset
 1750 LOCALT%
 1760 FORT%=0TOL%
 1770 REPEATu%(T%)=RND(17):v%(T%)=RND
(13)
 1780 UNTILu%(T%)<>x%ANDv%(T%)<>y%AND
B%(u%(T%),v%(T%))=FALSE
 1790 D%(T%)=25*T%+25
 1800 U%(T%)=u%(T%)*J%+J%
 1810 V%(T%)=v%(T%)*J%+K%
 1820 f%(T%)=FALSE
 1830 NEXT:PROCshscn
 1840 C%=2
 1850 ENDPROC
 1860 DEFPROChisc
 1870 CLS
 1880 IFs%>hs%(10)PROCcong ELSE PROCm
arch
 1890 ?&86=2
 1900 PROCtable
 1910 ENDPROC
 1920 DEFPROCtable
 1930 PROCwind
 1940 PROChead
 1950 PRINTTAB(5,2)"TOP-TEN"
 1960 FORT%=1TO10
 1970 COLOUR2
 1980 PRINTTAB(1,2+T%*2)STRING$(15,".
")
 1990 COLOUR3
 2000 PRINTTAB(1,2+T%*2)hs$(T%)
 2010 COLOUR6
 2020 PRINTTAB(17-LEN(STR$(hs%(T%))),
2+T%*2);hs%(T%)
 2030 NEXT
 2040 x%=7:y%=10
 2050 COLOUR6
 2060 PRINTTAB(2,25)"PRESS SPACE TO"
 2070 PRINTTAB(7,26)"PLAY"
 2080 REPEAT:PROCmuon:UNTILINKEY-99
 2090 ENDPROC
 2100 DEFPROCcong
 2110 IFM%=FALSE M%=TRUE:PROCton
 2120 ?&86=FALSE
 2130 FORT%=11TO14
 2140 COLOURT%
 2150 PRINTTAB(1,T%+7)"CONGRATULATION
S!"
 2160 NEXT
 2170 COLOUR6
 2180 PRINTTAB(2,24)"YOUR  SCORE IS"T
AB(2,26)"IN THE TOP TEN"
 2190 PROCmarch
 2200 VDU28,1,29,18,24:CLS
 2210 COLOUR3
```

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```
 2220 PRINTTAB(1,0)"PLEASE TYPE YOUR"
TAB(1,2)"NAME?"TAB(1,4);
 2230 COLOUR2
 2240 *FX21
 2250 LOCALX%,Y%,T%
 2260 ?&380=&90
 2270 ?&381=&3
 2280 ?&382=10
 2290 ?&383=32
 2300 ?&384=127
 2310 X%=&80:Y%=&3:A%=0:CALL&FFF1
 2320 hs%(10)=s%:hs$(10)=$&390
 2330 T%=10:REPEAT
 2340 IFhs%(T%+TRUE)<hs%(T%) s%=hs%(T
%+TRUE):$&390=hs$(T%+TRUE):hs$(T%+TRU
E)=hs$(T%):hs%(T%+TRUE)=hs%(T%):hs$(T
%)=$&390:hs%(T%)=s%
 2350 T%=T%+TRUE:UNTILT%=1
 2360 PROCwind
 2370 ENDPROC
 2380 DEFPROCmarch
 2390 LOCALx%,y%,c%,i%
 2400 PROCout
 2410 PROChead
 2420 COLOUR3
 2430 PRINTTAB(1,4)"SCORE :";s%TAB(1,
6)"LIVES :";l%TAB(1,8)"LEVEL :";L%+1T
AB(1,10)"HIGH  :";hs%(1)TAB(1,12)"BY
   :"hs$(1)
 2435 PRINTTAB(3,22)"PRESS SPACE"
 2440 y%=512:i%=1
 2450 FORx%=128TO1120STEP16
 2460 c%=x%MOD3
 2470 CALLP%,x%,y%,c%,i%
 2480 PROCdel(10)
 2490 PROCmuon
 2495 IFINKEY(-99)x%=1120
 2500 NEXT
 2510 PROCout
 2520 ENDPROC
 2530 DEFPROChead
 2540 COLOUR5
 2550 PRINTTAB(4,1)"PENDRAGON"
 2560 ENDPROC
 2570 DEFPROCmuon
 2580 IFNOTINKEY-102ORTIME<E% ENDPROC
 2590 IFNOTM% M%=TRUE:PROCton:ELSEM%=
FALSE:*FX13
 2600 E%=TIME+50
 2610 ENDPROC
 2620 DEFPROCmon
 2630 CLS
 2640 PROCmarch
 2650 PROCset
 2660 ENDPROC
 2670 DEFPROCout
 2680 i%=0:FORc%=0TO2:CALLP%,x%,y%,c%
,i%:NEXT
 2690 ENDPROC
 2700 DEFPROCborder
 2710 *FX14,4
 2720 *FX9,10
 2730 *FX10,10
 2740 DIMB%(17,13),U%(2),V%(2),u%(2),
v%(2),D%(2),f%(2),u1%(2),v1%(2)
 2750 VDU23;8202;0;0;0;
 2760 VDU19,9,8;0;19,10,15;0;
 2770 COLOUR134:CLS
 2780 VDU24,16;16;1256;1008;
 2790 GCOL0,130:CLG:GCOL0,6
 2800 FORX%=1TO79
 2810 GCOL0,X%MOD4+11
 2820 MOVEX%*N%,1024
 2830 DRAW1279-X%*N%,0
 2840 MOVE1280,1024-X%*12.8
 2850 DRAW0,X%*12.8
 2860 NEXT
 2870 VDU5:GCOL0,1
 2880 MOVE352,528:PRINT"PENDRAGON"
 2890 PROCdel(500):VDU4
 2900 VDU24,48;48;1224;976;
 2910 GCOL0,134:CLG
 2920 COLOUR128
 2930 ENDPROC
 2940 DEFPROCdel(D%)
 2950 D%=D%+TIME
 2960 REPEATUNTILTIME>D%
 2970 ENDPROC
 2980 DEFPROCscn
 2990 LOCALX%,Y%,T%
 3000 PROCwind
 3010 FORX%=0TO17
 3020 FORY%=0TO13
 3030 B%(X%,Y%)=-4*(RND(2)=1)
 3040 NEXT:NEXT
 3050 B%(x%,y%)=1
 3060 FORT%=2TO11STEP3
 3070 REPEAT
 3080 X%=T%+RND(3)+TRUE:Y%=RND(9)+2
 3090 UNTILB%(X%,Y%)<>1
 3100 B%(X%,Y%)=8
 3110 NEXT
 3120 ENDPROC
 3130 DEFPROCwind
 3140 VDU28,1,29,18,2
 3150 CLS:SOUND&11,2,250,40
 3160 ENDPROC
 3170 DEFPROCshscn
 3180 CLS
 3190 LOCALx%,y%,c%,i%,xx%,yy%,T%
 3200 FORc%=5TO7
 3210 CALLP%,x%,y%,c%,i%
 3220 NEXT
 3230 i%=3:T%=0
 3240 FORx%=0TO17
 3250 FORy%=0TO13
 3260 c%=B%(x%,y%)
 3270 IFc%=9c%=8
 3280 IFc%=8T%=T%-TRUE
 3290 IFc%=4ORc%=8:xx%=x%*J%+J%:yy%=y
%*J%+K%:CALLP%,xx%,yy%,c%,i%ELSEB%(x%
,y%)=0
 3300 NEXT:NEXT
 3310 IFT%<4FORc%=T%-TRUETO4:REPEATx%
=RND(16):y%=RND(12):UNTILB%(x%,y%)=4O
RB%(x%,y%)=0:B%(x%,y%)=8:x%=x%*J%+J%:
y%=y%*J%+K%:c%=8:CALLP%,x%,y%,c%,i%:N
EXT
 3320 FORC%=0TO2
 3330 CALLP%,X%,Y%,C%,I%
 3340 SOUND1,2,150+C%*12,6
 3350 REPEATUNTILADVAL-6=15
 3360 NEXT
 3370 ENDPROC
 3380 DEFPROCton
 3390 *FX14
 3400 ?&89=0
 3410 SOUND3,0,0,0
 3420 ENDPROC
 3430 DEFPROCgeths
 3440 DIMhs$(10),hs%(10)
 3450 FORT%=0TO9
 3460 hs$(T%-TRUE)=STRING$(10," ")
 3470 hs$(T%-TRUE)=$(&7700+T%*&10)
 3480 hs%(T%-TRUE)=!(&770B+T%*&10)
 3490 NEXT
 3500 ENDPROC
 3510 THEEND
 3520 REM there must be no spaces bet
ween the line number and the word "TH
EEND" in the previous line
 3530 DEFPROCcode
 3540 FORT%=0TO2STEP2
 3550 P%=&900
 3560 parbloc=&600
 3570 pointers=&70
 3580 xcoord=&78
 3590 ycoord=&7A
 3600 add=&7C
 3610 typeflag=&7D
 3620 xstore=&7E
 3630 inout=&7F
 3640 scnpoint=&80
 3650 incount=&84
 3660 colourcount=&85
 3670 col1=&86
 3680 col2=&87
 3690 astore=&88
 3700 notepointer=&89
 3710 xstore2=&8A
 3720 osword=&FFF1
 3730 [OPTT%
```

```
3740 .interupt
3750 STAastore
3760 STXxstore2
3770 PHA:TXA:PHA:TYA:PHA:PHP
3780 LDAastore:CMP#4:BNEtune
3790 .flash
3800 DECincount:BNEout
3810 LDAcol1:JSRoscall
3820 LDAcolourcount:STAblock
3830 LDAcol2:JSRoscall
3840 INCcolourcount:LDAcolourcount:C
MP#15:BNEnoch
3850 LDA#11:STAcolourcount
3860 .noch
3870 LDA#5:STAincount
3880 .out
3890 PLP:PLA:TAY:PLA:TAX:PLA
3900 RTS
3910 .oscall
3920 STAblock+1
3930 LDA#&C
3940 .oscall2
3950 LDX#block MOD256
3960 LDY#block DIV256
3970 JSRosword
3980 RTS
3990 .tune
4000 LDAxstore2:CMP#7:BNEout
4010 LDYnotepointer
4020 .tunbeg
4030 LDA#3:STAsblock+2
4040 LDAtunedata,Y
4050 BNEnote
4060 STAsblock+2
4070 .note
4080 BPLyok
4090 LDY#0:BEQtunbeg
4100 .yok
4110 STAsblock+4
4120 INY
4130 LDAtunedata,Y
4140 STAsblock+6
4150 INY
4160 STYnotepointer
4170 LDA#7
4180 LDY#sblock DIV256
4190 LDX#sblock MOD256
4200 JSRosword
4210 JMPout
4220 .QX
4230 LDX#7:LDY#11
4240 .loop1
4250 LDAparbloc,Y:STApointers,X
4260 DEX:DEY
4270 LDAparbloc,Y:STApointers,X
4280 DEY:DEY:DEX
4290 BPLloop1
4300 LDY#0
4310 LDA(pointers),Y:STAxcoord
4320 LDA(pointers+2),Y:STAycoord
4330 LDA(pointers+6),Y:STAtypeflag
4340 INY
4350 LDA(pointers),Y:STAxcoord+1
4360 LDA(pointers+2),Y:STAycoord+1
4370 SEC:LDA#0
4380 SBCycoord:STAycoord
4390 LDA#80
4400 SBCycoord+1:STAycoord+1
4410 CLC
4420 RORxcoord+1:RORxcoord
4430 LDAxcoord
4440 AND#248:STAxcoord
4450 CLC:LDAxcoord+1
4460 ADC#&30:STAxcoord+1
4470 CLC
4480 RORycoord+1:RORycoord
4490 CLC
4500 RORycoord+1:RORycoord
4510 LDAycoord:AND#7
4520 CLC
4530 ADCxcoord:STAxcoord
4540 LDAxcoord+1:ADC#0
4550 STAxcoord+1:LDX#3
4560 .loop2
4570 CLC:RORycoord
4580 DEX:BNEloop2
4590 LDA#&80:STAadd
4600 LDA#2:STApointers+6
4610 LDX#5
4620 .loop3
4630 CLC
4640 RORycoord:BCCnocarry
4650 CLC
4660 LDAxcoord
4670 ADCadd:STAxcoord
4680 LDAxcoord+1
4690 ADCpointers+6:STAxcoord+1
4700 .nocarry
4710 ASLadd:ROLpointers+6
4720 DEX:BNEloop3
4730 LDY#0:STYinout
4740 LDA(pointers+4),Y
4750 ASLA:TAX
4760 LDAdata,X:STAdatapoint+1
4770 LDAdata+1,X:STAdatapoint+2
4780 LDAoldloc,X:STAmem
4790 LDAoldloc+1,X:STAmem+1
4800 LDAxcoord:STAoldloc,X
4810 LDAxcoord+1:STAoldloc+1,X:
4820 LDAtypeflag:AND#2
4830 CMP#2:BEQonscreen
4840 STXxstore
4850 JSRprint
4860 LDXxstore
4870 LDAtypeflag:BNEonscreen
4880 JSRgone
4890 .onscreen
4900 LDAoldloc,X:STAmem
4910 LDAoldloc+1,X:STAmem+1
4920 .put
4930 INCinout
4940 JSRprint
4950 LDAtypeflag
4960 CMP#3:BNEtheend
4970 LDXxstore:JSRgone
4980 .theend
4990 RTS
5000 .gone
5010 LDA#&E0:STAoldloc+1,X
5020 RTS
5030 .print
5040 LDY#0:LDX#0
5050 .loop4
5060 LDAmem:STAscnpoint
5070 LDAmem+1:STAscnpoint+1
5080 LDA#16:STAcounter
5090 .loop5
5100 LDAinout:BEQwipe
5110 .datapoint
5120 LDA&9000,X
5130 .wipe
5140 STA(scnpoint),Y
5150 INX
5160 CPX#64:BEQalldone
5170 INCscnpoint:BNEunit
5180 INCscnpoint+1
5190 .unit
5200 DECcounter:BNEsamecolumn
5210 CLC:LDAmem
5220 ADC#8:STAmem
5230 LDAmem+1
5240 ADC#0:STAmem+1
5250 JMPloop4
5260 .samecolumn
5270 LDAscnpoint
5280 AND#7:BNEloop5
5290 CLC:LDAscnpoint
5300 ADC#&78:STAscnpoint
5310 LDAscnpoint+1:ADC#2
5320 STAscnpoint+1:JMPloop5
5330 .alldone
5340 RTS
5350 .counter:NOP
5360 .mem:NOP:NOP
5370 .oldloc
5380 ]
5390 data=P%+20
5400 P%=&D02
5410 [OPTT%
5420 .sblock
5430 ]:P%=P%+8:[OPTT%
5440 .block
```

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```
5450 ]
5460 tunedata=P%+8
5470 NEXT
5480 REM.oldloc
5490 DATA90009000
5500 DATA90009000
5510 DATA90009000
5520 DATA90009000
5530 DATA00009000
5540 REM.data
5550 DATA0BC00B80
5560 DATA0C000C00
5570 DATA0C800C40
5580 DATA0C800C80
5590 DATA00000CC0
5600 REM.left bird
5610 DATA0F0F0000
5620 DATA00000000
5630 DATA00000000
5640 DATA00000000
5650 DATA0C181D0C
5660 DATA3333330C
5670 DATA33333333
5680 DATAC3CC1133
5690 DATA0C2E2E0C
5700 DATA30303030
5710 DATA33323230
5720 DATAC36E3333
5730 DATA08080808
5740 DATA30303030
5750 DATA30303030
5760 DATA00103232
5770 REM.right bird
5780 DATA04040404
5790 DATA30303030
5800 DATA30303030
5810 DATA00203131
5820 DATA0C1D1D0C
5830 DATA30303030
5840 DATA33313130
5850 DATAC39D3333
5860 DATA0C242E0C
5870 DATA3333330C
5880 DATA33333333
5890 DATAC3CC2233
5900 DATA0F0F0000
5910 DATA00000000
5920 DATA00000000
5930 DATA00000000
5940 REM.mid bird
5950 DATA04101504
5960 DATA30303024
5970 DATA30303030
5980 DATA44612031
5990 DATA0D2F2E0C
6000 DATA3333330C
6010 DATA33333333
6020 DATA082A3333
6030 DATA0E1A1D0C
6040 DATA3333330C
6050 DATA33333333
6060 DATA41153333
6070 DATA082A2A08
6080 DATA30303018
6090 DATA30303030
6100 DATA82981032
6110 REM.ice cube
6120 DATA35351010
6130 DATA35343434
6140 DATA34343435
6150 DATA10103535
6160 DATA3C3C3030
6170 DATA3D3D3E3E
6180 DATA3E3E3D3D
6190 DATA30303C3C
6200 DATA3C3C3030
6210 DATA3E3E3D3D
6220 DATA3D3D3E3E
6230 DATA30303C3C
6240 DATA3A3A2020
6250 DATA3A383838
6260 DATA3838383A
6270 DATA20203A3A
6280 REM.baddy
6290 DATA4A4A1F11
6300 DATA0F0F0F1F
6310 DATA050F0F1B
6320 DATA05050505
6330 DATAAFAF2F33
6340 DATA0F1B0F2F
6350 DATA050F330F
6360 DATA00000005
6370 DATA4A4A1F33
6380 DATA0F270F1F
6390 DATA0A0F330F
6400 DATA0000000A
6410 DATAAFAF2F22
6420 DATA0F0F0F2F
6430 DATA0A0F0F27
6440 DATA0A0A0A0A
6450 REM.emerald
6460 DATA00000000
6470 DATADADA4545
6480 DATA4545DADA
6490 DATA00000000
6500 DATADADA4545
6510 DATAF6F6F1F1
6520 DATAF1F1F6F6
6530 DATA4545DADA
6540 DATAE5E58A8A
6550 DATAF9F9F2F2
6560 DATAF2F2F9F9
6570 DATA8A8AE5E5
6580 DATA00000000
6590 DATAE5E58A8A
6600 DATA8A8AE5E5
6610 DATA00000000
6620 REM.end of sprite data
6630 DATAFFFFFFFF
6640 REM.sprite data checksums
6650 DATA34CAA483
6660 DATA13C15759
6670 REM.background tune
6680 DATA02490100
6690 DATA01510149
6700 DATA04590459
6710 DATA02490449
6720 DATA04590249
6730 DATA04490459
6740 DATA02590449
6750 DATA02590259
6760 DATA02620259
6770 DATA02590262
6780 DATA04510259
6790 DATA01510451
6800 DATA02450300
6810 DATA04510249
6820 DATA04450451
6830 DATA04510445
6840 DATA04450451
6850 DATA02650451
6860 DATA02650265
6870 DATA02620265
6880 DATA02510262
6890 DATA04490251
6900 DATA01490449
6910 DATA02490300
6920 DATA04590251
6930 DATA04490449
6940 DATA02510249
6950 DATA04490459
6960 DATA02490449
6970 DATA04590251
6980 DATA04620459
6990 DATA04510459
7000 DATA04510451
7010 DATA02490245
7020 DATA02510251
7030 DATA02510251
7040 DATA02450245
7050 DATA02490245
7060 DATA02510251
7070 DATA02510251
7080 DATA02450245
7090 DATA02650451
7100 DATA02650265
7110 DATA02620265
7120 DATA02510262
7130 DATA04490251
7140 DATA03490449
7150 REM.end of tune data
7160 DATAFFFFFFFF
```

```
 7170 REM.tune checksum values
 7180 DATAF9AAFDD8
 7190 DATA8D079022
 7200 REM.assembler checksum values
 7210 DATA50A9DB01
 7220 DATA8C786011
 7230 DATAMr.SPOCK,12930
 7240 DATALUBILU,10435
 7250 DATATARZAN,9845
 7260 DATARAMBO,7295
 7270 DATACURLY,5495
 7280 DATASUPER TED,4895
 7290 DATAKING KONG,4655
 7300 DATAAUNTY MEG,3495
 7310 DATARATMAN,2235
 7320 DATABOBBIN,1615
 7330 ?&220=0
 7340 ?&221=9
 7350 ?incount=5
 7360 ?block=15
 7370 ?colourcount=11
 7380 ?col1=2
 7390 ?col2=7
 7400 !sblock=3
 7410 sblock!2=3
 7420 sblock!4=0
 7430 ?notepointer=0
 7440 P%=Q%:C%=0:D%=0
 7450 RESTORE5490
 7460 FORT%=0TO39STEP4
 7470 A%=FNread
 7480 oldloc!T%=A%
 7490 PROCcheck(A%)
 7500 NEXT
 7510 T%=&B80
 7520 REPEAT
 7530 A%=FNread
 7540 IFNOTA% !T%=A%:T%=T%+4:C%=C%EOR
A%:D%=D%+A%
 7550 UNTILA%=TRUE
 7560 PROCconfirm("SPRITE DATA")
 7570 T%=0:C%=0:D%=0
 7580 REPEAT
 7590 A%=FNread
 7600 tunedata!T%=A%
 7610 PROCcheck(A%)
 7620 T%=T%+4
 7630 UNTILA%=TRUE
 7640 PROCconfirm("TUNE DATA")
 7650 C%=0:D%=0
 7660 FORT%=&900 TOoldloc STEP4
 7670 PROCcheck(!T%)
 7680 NEXT
 7690 PROCconfirm("ASSEMBLER")
 7700 FORT%=&7700 TO&7790 STEP&10
 7710 READA$,A%
 7720 $T%=A$:!(T%+&B)=A%
 7730 NEXT
 7740 A%=RND(-TIME)
 7750 ENDPROC
 7760 DEFPROCcheck(A%)
 7770 C%=C%EORA%
 7780 D%=D%+A%
 7790 ENDPROC
 7800 DEFPROCconfirm(error$)
 7810 IFC%<>FNread ORD%<>FNread CLS:P
RINT''"THERE IS AN ERROR IN THE "erro
r$'"PLEASE CHECK YOUR LISTING":VDU7,7
:END
 7820 ENDPROC
 7830 DEFFNread
 7840 READA$
 7850 A$="&"+A$
 7860 =EVAL(A$)
 7870 DEFFNinstruct
 7880 LOCALT%,Q%
 7890 FORT%=1TO15
 7900 VDU28,0,11,39,0:PRINTTAB(39,11)
 7910 VDU28,0,24,39,12,11,26
 7920 SOUND&11,2,60+T%*4,1
 7930 IFT%=2Q%=FNqinst
 7940 NEXT
 7950 IFNOTQ%THEN=Q%
 7990 VDU30,28,1,23,38,1,23;10,64;0;0
;0;
 8000 REPEAT
 8010 READA$
 8020 IFVAL(A$) A$=CHR$(VAL(A$))
 8030 IFA$=CHR$13 A$=A$+CHR$10+CHR$13
4
 8040 IFA$=CHR$10 A$=A$+CHR$134
 8050 IFA$="E"A$=CHR$130+"EMERALD"+CH
R$134
 8060 IFA$="S"A$=STRING$(8," ")
 8070 IFA$="."A$=STRING$(8,".")
 8080 IFA$="XXX"UNTILTRUE:VDU23;8202;
0;0;0;:=Q%
 8090 PROCslow(A$)
 8100 UNTILFALSE
 8110 DATA13,133,PENDRAGON,134,is a g
ame of skill and,13,reaction.
 8120 DATA13,10,You will play the par
t of :-,13,Polly,133,Pendragon,134,a
Parrot with a,13,problem!
 8130 DATA13,10,You are employed in a
 sugar,13,processing factory that is
infested,13,with the,131,yellow peril
,",",134,monsters that,13,eat sugar c
ubes and bite parrots!
 8140 DATA13,10,In each room of the f
actory there,13,are four large,130,EM
ERALDS.,134,You must,13,push one,E,in
to each corner of,13,the room so that
 you can gain entry
 8150 DATA13,to the next level where
you will,13,find more sugar cubes and
 even more,13,monsters.
 8160 DATA13,10,Pushing a sugar cube
that cannot,13,move will transport it
 to the,13,packaging room in the next
 building,13,and give you ten points.
 8170 DATA13,10,Pushing a sugar cube
or an,E,13,onto a monster will banish
 the,13,fiend from the room for a sho
rt,13,period of time and give you fif
ty,13,points. Though take care for th
ey,13,sometimes duck!
 8180 DATA13,10,Pushing an,E,into a c
orner,13,will give you two hundred po
ints.
 8190 DATA13,10,Getting an,E,in each
corner,13,will give you one thousand
points.
 8200 DATA13,10,You can switch the mu
sic on or off,13,by pressing 'M',13
 8210 DATA13,13,13,10,To move use the
 following keys:-,13,10,S,Z,.,LEFT,13
,10,S,X,.,RIGHT,13,10,S,:,.,UP,13,10,
S,/,.,DOWN,13,10,S,SPACE....PUSH,13,1
0,S,M,.,MUSIC ON/OFF
 8220 DATA13,13,13,10,136,133,PRESS S
PACE TO PLAY THE GAME
 8230 DATAXXX
 8240 DEFFNqinst
 8250 LOCALT%,Q%
 8260 PRINTTAB(10,9)" "TAB(10,14)" "
 8270 FORT%=11TO12
 8280 PRINTTAB(6,T%)CHR$141CHR$134CHR
$157CHR$132"INSTRUCTIONS? Y/N  "CHR$1
56
 8290 NEXT
 8300 REPEAT
 8310 Q%=GETAND223
 8320 UNTILQ%=78ORQ%=89
 8330 =Q%=89
 8340 DEFPROCslow(A$)
 8350 LOCALT%,A%
 8360 FORT%=1TOLENA$
 8370 PROCmuon
 8380 PRINTMID$(A$,T%,1);
 8390 PROCdel(5)
 8400 NEXT
 8410 ENDPROC
 8420 DEFPROCbanner
 8430 IF INKEY-256 A%=&EA:X%=0:Y%=&FF
:IF USR(&FFF4) AND&FF00 CLS:PRINTTAB(
0,10)"Please turn your TUBE off, and
start"'"again.":VDU7,7,7:END
 8440 ENVELOPE1,4,-1,-1,-1,30,30,30,1
26,-1,-1,-1,126,0
 8450 ENVELOPE2,4,-5,-5,-5,1,1,1,126,
-4,-4,-4,126,0
```

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```
 8460 ENVELOPE3,3,1,1,1,1,1,1,126,-60
,-60,-20,126,0
 8470 ENVELOPE4,1,16,16,16,8,8,8,126,
0,-1,-1,126,0
 8480 M%=TRUE:E%=FALSE
 8490 VDU22,7,23;8202;0;0;0:
 8500 LOCALT%
 8510 FORT%=0TO12
 8520 IFT%MOD12=0PRINTTAB(16,T%-(T%=1
2)*11)CHR$157SPC(4)CHR$156 ELSEPRINTT
AB(16-T%,T%)CHR$157CHR$130CHR$157TAB(
18+T%,T%)CHR$135CHR$157" "CHR$156TAB(
16-T%,23-T%)CHR$157CHR$130CHR$157TAB(
18+T%,23-T%)CHR$135CHR$157" "CHR$156
 8530 SOUND&11,2,108-T%*4,1
 8540 NEXT
 8550 FORT%=11TO12
 8560 PRINTTAB(10,T%)CHR$141CHR$131CH
R$157CHR$129"PENDRAGON"CHR$130" "CHR$
157
 8570 NEXT
 8580 PRINTTAB(16,14)CHR$132"by-"TAB(
11,15)CHR$132:$&7E64="Gordon J. Key"
 8590 *FX211,2
 8600 J%=64:K%=128:N%=16:O%=32
 8610 ENDPROC
 8620 DEFPROCshorten
 8630 *tape
 8640 IF$&7E64<>"Gordon J. Key"PROCba
nner
 8650 PROCmoveprog
 8660 PROCcode
 8670 PROCton
 8680 T%=PAGE+1
 8690 REPEAT
 8700 IFLEN$T%=0T%=T%+1
 8710 T%=T%+LEN$T%+1
 8720 IF?T%=&FF CLS:PRINT''"LINE 3510
 IS INCORRECT !!!":VDU7,7:END
 8730 UNTILLEFT$($(T%+3),6)="THEEND"
 8740 PRINTTAB(5,24)CHR$136CHR$133"PR
ESS SPACE TO CONTINUE"CHR$30
 8750 REPEATUNTILINKEY-99
 8760 IFFNinstruct REPEATPROCmuon:UNT
ILINKEY-99
 8770 PROColdrun
 8780 *FX3,2
 8790 ?T%=&FF
 8800 END
 8810 DEFPROColdrun
 8820 *FX21
 8830 *FX138,0,203
 8840 *FX138,0,13
 8850 *FX138,0,249
 8860 *FX138,0,13
 8870 ENDPROC
 8880 DEFPROCmoveprog
 8890 IFPAGE=&E00 PRINTTAB(5,24)SPC(2
5)CHR$30:ENDPROC ELSE IF PAGE<&E00 CL
S:PRINTTAB(0,10)"PAGE is set too low
to run. Please"'"reset to &E00 or hig
her and start again.":VDU7,7,7:END
 8900 PROColdrun
 8910 PRINTTAB(5,24)CHR$136CHR$134"RE
LOCATING TO PAGE &E00"CHR$30
 8920 *FX3,2
 8930 FORT%=0TOTOP-PAGE STEP4:T%!&E00
=T%!PAGE:NEXT:PAGE=&E00
```

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In Part 38 of his course MIKE COOK shows how to link your BBC Micro to the outside world with proximity switches

Look – no hands!

AT a recent exhibition I was surprised at the number of people asking me about sensing problems who had never heard of proximity switches. So this month I want to look at these useful gadgets and see what makes them tick and how our BBC Micro can harness them.

I first worked with proximity switches just after leaving school, when computers filled a room and log tables and slide rules were the order of the day.

One of my first projects was fitting up weaving looms with proximity switches so a central computer could monitor the state and productivity of each loom in the shed. They were quite a new concept then and they have improved considerably over the years.

Basically, a proximity switch senses when something is close to it. Its obvious application is to replace a mechanical limit switch. As limit switches have to work many times mechanical devices will inevitably wear out. This is especially true the more often they are tripped.

As a proximity switch has no moving parts its reliability is greatly improved. They can also switch at a faster rate than can mechanical micro switches, so other applications are open for their use.

There are two types of proximity switch – inductive and capacitive. The inductive ones respond to the presence of metal and the capacitive ones respond to most objects including us. As the names imply, they work on different principles, so let's look at the inductive switch first.

Figure I shows an oscillator connected to an inductor. In fact the inductor is part of the oscillator feedback circuit and so carries an alternating current. This produces an alternating magnetic field around the coil.

Whenever an alternating magnetic field is placed next to a conductor an electric current is induced. So if the coil is placed next to some metal small circulating currents will be induced in the metal. These are known as eddy currents.

The heating effect on the metal is negligible but the eddy currents need energy to sustain them, this being drawn out of the oscillator. As the metal target approaches the energy drain increases to such an extent that the oscillator stalls or stops oscillating.

When this happens the inductor is no longer being supplied by an alternating current but by a direct current. This means that it will draw more current, as inductors resist electrical current flow at high frequencies, exactly the opposite of capacitors which resist the flow at low frequencies.

Finally, this increase in current can be detected and used to signal that something is in front of the proximity switch. As the load on the inductor needed to stop it oscillating is smaller than the load it can start oscillating with a hysteresis effect is built in.

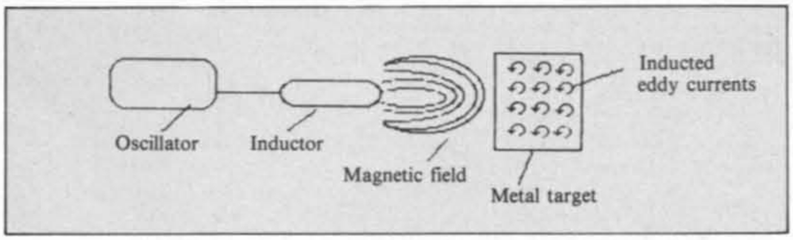

Figure I: The effect of an AC magnetic field

This prevents switch chattering when the target is just on the switching distance. The switch on distance is shorter than the switch off distance as the target approaches and the proximity switch turns on. As the target recedes it turns off.

Making your own inductive proximity switch for your BBC Micro would be a good school project. The oscillator needs to run at one to two MHz and the inductor can be wound on a ferrite core. If you place a small resistor in series with the supply there will be a voltage rise across it as the oscillator stalls.

You can then feed this back to a threshold detector and thus get a switch output. Various different oscillator circuits could be used – the one shown in Figure II is a resonant frequency oscillator.

The feedback is provided by a second winding, the dots indicating the start of the winding. Note this is connected to give an out-of-phase feedback. If this is not done it will not oscillate. As it is an experimental circuit, component values have not been shown.

For those who just want to use a proximity switch you can get them ready built. They are three-wire devices encapsulated in resin which come in various guises but most have a threaded shaft for bolting into holes. Different switches work over different voltage ranges, anything from 4.75 volts DC right up to main voltage AC.

Their switching ranges vary from 0.8mm to 20mm and some are capable of switching up to 500mA directly. That's enough current to drive a small relay.

Figure III shows the output the user

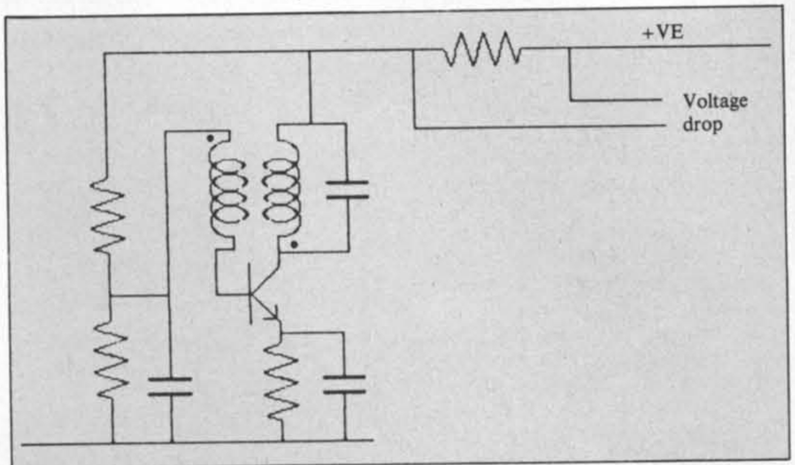

Figure II: A resonant-circuit oscillator

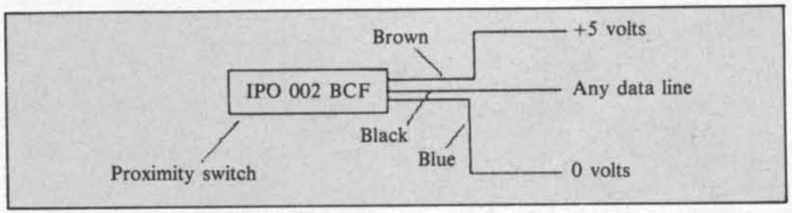

Figure III: Connecting a switch to the user port

port sees from an IPO 002 BCF switch which works on any DC voltage from 4.75 to 30 volts.

It even has a built in pull-up resistor so we can easily connect it up to the BBC Micro's user port, although it can switch a load up to 250mA. This switch has a plastic cover and so may be mounted flush in metal although better results are obtained if it is not.

The sensing distance is 2mm on a standard target. A standard target is a square sheet that is made of mild steel which has its sides three times the sensing range or the diameter of the sensor, whichever is larger. This ensures that all the field is collected by the target and gives the maximum range. If the target size is reduced, the range will be reduced.

Typically, if the target area is reduced to 25 per cent of the standard size the range is reduced by 85 per cent. Mild steel has nearly the best range, but for other metals the range is reduced. Table I shows typical reduction rates for inductive proximity switches. A good target is ordinary aluminium foil stuck onto a non-conducting surface.

Material	Range effect
Mild steel	1.0
Cast iron	1.1
Aluminium foil	0.9
Stainless steel	0.7
Brass	0.4
Aluminium	0.33
Copper	0.3

Table I: The effect of target material on inductive switches

How can we use the switches with our BBC Micro? The most obvious situation is when you want your buggy or robot to monitor the presence of something.

You can also use it for timing. Many experiments in mechanics involve timing an object over a measured distance. With two sensors you could use your computer to do this timing. In industry they are often used to count or monitor objects on conveyor belts.

A less obvious application is to measure the speed of rotation without making contact. As the speed of switching can be up to 1000Hz then with a target made of a strip of foil half way around the shaft you can measure speeds up to 30,000 rpm.

If you are using a cog as in Figure IV remember that the frequency you measure will be a multiple of the actual shaft speed – the exact factor will depend upon the number of cogs.

The computer program to do this is the same as you need to measure frequency. Various frequency measurement techniques were given in the September 1984 Body Build article.

Any effect in the world of inductors usually has a similar effect in the world of capacitors. The same is true of proximity switches. The great advantage of capacitive proximity switches is that they respond to metallic and non-metallic objects.

Capacitance exists between any two plates and the value of the capacitor depends on the area of the plates and the distance between them. The larger the plates or the closer they are the greater is the capacitance.

Another factor in determining capacitance is the substance between the plates. Each substance affects the capacitance to a different extent and the effect is summed up in a value known as the dieletric constant.

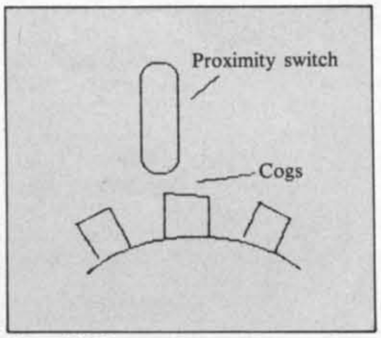

Figure IV: Rev counter

If we have one plate of our capacitor in the sensor the target can be the other plate. As all objects are effectively capacitively coupled to earth if we earth our sensor we will form an earth return circuit. So when the plates get close

→

From Page 121

enough there is enough capacitance to start up an oscillator, when they get further apart it stalls.

The change in current drawn by the oscillator can be measured, and hence a switch can be made. Note that this is the opposite effect to an inductive proximity switch.

Figure V shows a circuit that can demonstrate the effect. The frequency of oscillation is determined by the value of capacitor.

Due to stray capacities this could always be in oscillation or it could stall. Each cycle of oscillation fires a monostable. This produces a fixed width pulse; the faster the oscillator the more frequent are the pulses and so the higher is the output on the capacitor. This is then taken to level detector. Again the values in Figure V are just experimental.

You can also get ready-built capacitive proximity switches and they can be wired up just like inductive switches. The CPO 02V DNS requires a voltage between 8 and 30 volts and has a sensing distance of 20mm.

As this voltage is more than the BBC Micro's user port can stand you will have to use a transistor to reduce it as shown in Figure VI.

Capacitive switches have a small adjusting screw so that the range may be altered. This can also tune out the effects of any stray capacitance due to fixed objects or the sensors mounting.

You can increase the range of these switches by gluing a large plate on the front, as long as you have enough tuning control to nullify the effect of the plate.

Material	Range effect
Mild steel	1.0
Cast iron	1.1
Aluminium foil	0.9
Stainless steel	0.8
Brass	0.8
Aluminium	0.95
Copper	0.95
Water	1.0
PVC	0.5
Glass	0.5
Ceramics	0.4
Wood	from 0.2
Beer	0.7
Coca Cola	0.65
Lubricating oil	0.1

Table II: The effect of target material on capacitive switches

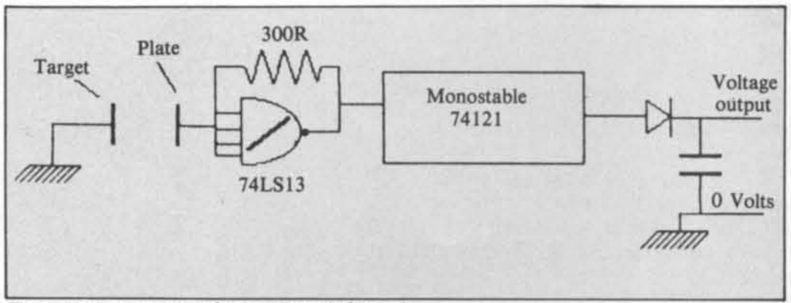

Figure V: An experimental capacitive switch circuit

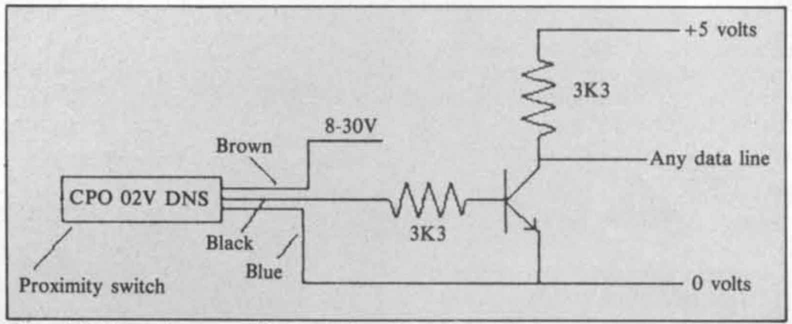

Figure VI: Connecting a capacitive proximity switch to the computer

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Table II shows the effect on range for various different target materials.

A good use of these switches is in touch controls like those found in some lifts. They also make good liquid level detectors as the liquid forms the other plate of the capacitor. In this way the liquid never comes in contact with the sensor.

By gluing a ring or clip on the front of the sensor you can bend the field and so concentrate it. In this way you could detect the presence of a liquid in a nonmetallic tube, as shown in Figure VII.

Proximity sensors are not cheap or easy to get hold of, so on offer this month in Body Build Pack 32 is a capacitive and inductive proximity switch. You can find the order form on page 147.

We have seen what we can do when we are at close proximity so now I'll back off until next month.

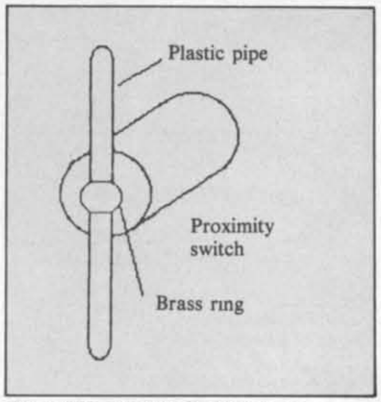

Figure VII: Detecting liquid in a pipe

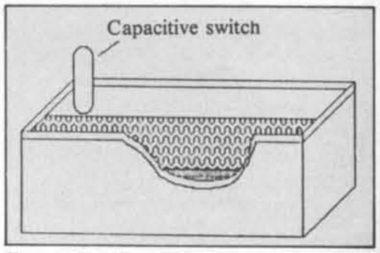

Figure VIII: Sensing liquid level

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B         TOOLKIT1.21
A         DFS,NET(C)ROFF
9         WORDWISE-PLUS1.49
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7         FX-80 PRINT 1.00
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C  =.METEORS        D  M.ARCADEN
E  B.DEFENDR        F  =.DEFENDR
G  R.AUTOBEE        H  R.The BASI
I  B.CANDLE         J  B.VULTURE
K  +.JBEPSON        L  B.MATCH
M  M.FEASIBL        N  -.UNLOCK
O  B.DISPROG        P  +.DISPROG
Q  B.DFSPACE        R  B.LOADMNU
S  B.TITLES         T  B.LOADER
```

•MENU FACILITIES

Three menus available, Load menu, Run menu, and Disk Free Space display. All Menus are mode 7 colour displays accessible using a * command, or more efficiently using L/Break, M/Break and O/Break.
Menus are 'networked', switch between them at the touch of a key.
Load menu loads BASIC programs and automatically lists them with page mode set on – with a single keystroke! However, if you have The Acorn BASIC Editor Rom in your machine, it is entered with insert mode set.
Load menu also loads machine code programs at the correct address for subsequent disassembly. Automatically detects a Rom and prompts for a destination Ram socket.
Touch the COPY key and invoke the Copy menu. Select the files, select the target drive, and BEEBAID does the rest for you. Handles duplicate files, locked files and multiple destination drives.
The Run menu enables BASIC and machine code programs to be executed easily – by all the family! Supersedes all other well known Run menus – B, B+, Master and Tube compatible.
Disk Free Space Display shows the size of all files on a disk and the location of the free space. Touch a key to swap between hex and decimal. Hit 'C' for automatic compact.

DISC FREE SPACE DISPLAY

```
Drive 0         01--SAMPLE         80 Track
                01--SAMPLE
FILENAME  SIZE FRE  FILENAME  SIZE FRE

   Catalogue
$.!BOOT       1     B.METEORS    4
=.METEORS    34     M.ARCADEN   76
B.DEFENDR     6     =.DEFENDR   35
R.AUTOBEE    64     R.The BASI  64
B.CANDLE      3     B.VULTURE   28
+.JBEPSON    11     B.MATCH     24
M.FEASIBL    71     -.UNLOCK     2
B.DISPROG     1     +.DISPROG    1
B.DFSPACE     1     B.LOADMNU    1   49
B.TITLES     20     B.LOADER     3  299

Largest free space:               49 sectors
Total free space:                348 sectors
Catalog entries:                  20 Free: 11
```

•AND MUCH MORE

Dump the current text window to the printer with *DTWindow.
Zeroise memory segments using *ERASE commands, including selectable Ram sockets.
Turn the Tube on and off using *TUBEON and *TUBEOFF. Preserves status of text or programs held in second processor.
Relocate any memory segment with *SHIFT.
Relocate any BASIC program with *MOVE.
Disable the Econet system using *NONET.
Load a program to the correct address using *DOWNLOAD.
Enhance your BBC Micro with some 20 additional Break commands.

•DISK FILE INDEXING SYSTEM

In addition to all the facilities already listed, the BEEBAID Rom is supplied with a Disk File Indexing system. This system automatically maintains an index of all your software and allows you to categorise your programs, eg. Games, Educational, Simulation etc. It can be dynamically tailored to your own requirements, eg. your disk drive configuration and which directories you want to index. The Index may be searched by program name, disk number or category. It is supplied on a 40/80 compatible disk with its own bound manual and it is FREE!

BEEBAID is fully 6502 second processor compatible and has been tested on model B, B+ 128 and Master Series machines using the Acorn DFS. It has been tested with several sideways Ram boards including ATPL, Watford, Solidisk and Acorn User, using single and multiple Ram sockets. It has also been compatibility tested with many other Roms including the VIEW family, Wordwise and Wordwise Plus, AMX Mouse, Disc Doctor, BITSTIK, Teletext, Prestel and many more. BEEBAID eliminates conflicting Rom problems.

To order your copy of BEEBAID, simply fill in the cutout and send it with a cheque or postal order payable to:

JAYSOFT at:
114 KINGSWAY, WEST WICKHAM,
KENT BR4 9JQ

Please send me .... BEEBAID packages comprising 16K Rom, 40/80 compatibile disk and 2 manuals at £34 inclusive. I enclose a cheque/postal order for £ ....
Name ....
Address ....
....
....
....

Order dispatched by return of post.

£10 Prize letter

A better way to make the Midi connection

I HOPE I can offer more complete advice to Tony Lancaster who wrote in the April Micromail that he wanted to link his keyboard and BBC Micro Midi fashion.

Mike Cook's hint that modification of the BBC Micro would be unwise missed the mark. While modification is surely possible, especially by Mike's capable fingers, it seems a rather senseless and non-productive exercise.

Not only is the UMI-2B interface available at around £500 from the London Rock Shop (also at Bristol) as Mike said, but a rather cheaper alternative exists from EMR, 14 Mount Close, Wickford, Essex, SS11 8HG, Tel: 0702 335747 and 03744 627221. This costs about £80 and so far five software packages are available ranging from £25 to £50.

Given a choice and being able to justify spending £500 I'd plumb for the UMI-2B, but then you do tend to get what you pay for.

The EMR software has lots of features and lets you get right down to the nitty-gritty of Midi bytes. It may appear a little daunting to the absolute newcomer, but compared with other Midi packages it's good value for money.

The E&MM interface also looks good value for money but the software is very limited.

There is also the Hinton Midic 1.1 at around £300 which provides an interface between Midi equipment and a computer with an RS232 socket.

No software is yet available but a utility program is included for people who would like to write their own software.

I'm afraid the biggest choice of Midi hardware and software is for the Commodore 64 and there are packages and programs for this computer which no one seems to be thinking about for the BBC Micro. – **Ian Waugh, Whitburn, Sunderland.**

That Master manual

I AM sure by now you are receiving many letters either extolling the virtues of the new Master series or otherwise, but I feel I must write and endorse the comments of your correspondent J.R.A. Macrae (May issue).

I too have taken delivery of a Master Series 128 following several years excellent service from a BBC B, and find the overall package disappointing. The machine itself is exceptional, but it is let down by Acorn's poor documentation and supply of relevant details necessary for full utilisation of the system.

If it is their intention to eventually phase out the B and B+ models, then one can categorically say that this replacement is not for the beginner, unless a more informative and complete manual is provided. They will obviously argue that the manual is not intended as a means for a complete understanding of the system or learning programming as they did with the Model B, but surely the main purpose of buying a machine of this complexity is to use it to its full potential?

The insight given into the firmware is sparse indeed. It has often been said of View and Viewsheet that you either love or hate them, and it is not going to be endeared to many without a full presentation. I find Viewsheet particularly lacking. Presentation should be of prime importance on a spreadsheet, yet the examples illustrated in the Welcome manual are very poor in this respect.

We are shown indented and abbreviated labels so they can be accommodated into a field of eight characters. I understand the field width can be altered, but the method is described in the Viewsheet guide at extra cost. Can anybody help here?

As a keen micro enthusiast my main usage of the machine is as a learning tool. Last year I installed ISO Pascal in the Model B, and would now like to switch this language to the Master. However I gather from literature recently received from Acorn that to insert the two ROMs I would need to alter two links which would effectively reduce the amount of available RAM.

By how much they don't say, neither do they say whether it is better to implement this via the cartridge ROM system. Can the cartridge take two ROMs or is this another £30 I must find? Any advice would be welcome.

Acorn's promotion of the Master Series in the press outlines the potential of each machine in the series, but they appear reluctant to tell purchasers how to use it without incurring substantial extra costs for the required reference manuals.

Perhaps they are exploiting the potential still further and will produce yet more added extras. They are obviously unsure of what the priorities are in terms of what we need to know, reference their recent price list which shows manual two available before manual one!

Finally thanks for a superb

→

Win a tenner

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the three most interesting letters will each receive a £10 prize.*

NEC printer codes

I RECENTLY bought the Mirrorsoft program Fleet Street Editor.

Although I told the company that I owned an NEC PC-8023B-C printer I now find that I cannot use the program with this printer unless I input the codes to select 640 dot bit image mode, select 960 dot bit image mode, select 24/216 line feed, select 1/216 line feed, select 12/216 line feed and reset the printer.

The NEC printer was sold in large numbers to BBC Micro owners and many of them will want to use Fleet Street Editor. Excellent though it may be it is a waste of £40 if you cannot get printed copy.

Although the printer manual has lots of technical information it does not satisfactorily explain what codes to use to achieve the above modes.

Can you supply the codes required to use Fleet Street Editor with a NEC printer or must I consign my unused, expensive new software to the ever growing pile of junk?

Can I use my Beebugsoft Dumpmaster program with FSE? Does the AMX Pagemaker support the NEC printer? – **Barry Woodward, Boston, Lincs.**

● We do not have access to the NEC printer you mentioned so we can't tell you the codes required.

However there must be someone out there who can answer your questions.

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magazine, where would all us BBC Micro enthusiasts be without you. Keep up the good work. – **B. Townsend, Coventry.**

● The links you refer to control whether the ROM is 16 or 32k, so there should be no loss of RAM. If you do decide to go for the cartridge system Advanced Computer Products sell ROM adapters for use with the Master Series. Sorry we can't help with Viewsheet – but perhaps one of our readers can.

Downloading from BBC

I BOUGHT an Acorn Teletext Adapter from your magazine a fortnight ago. The teletext mode functions well except for the downloading of telesoftware programs from the BBC which could not be done.

On BBC1 page 704, which shows the catalogue of telesoftware programs, the top and bottom lines display:

Patch 2 The TFS upgrade.

Use Patch 2 with Acorn adapters.

Not knowing exactly what these mean I downloaded the Patch 2 program into my BBC B. However the message Syntax error appeared as soon as I pressed Return which was the instruction at the end of the loaded program.

When I attempted to save this program, the message "Illegal operation" came up and then "Illegal operation at line 180" as I typed RUN.

Messages of "Mistake" and "Syntax error" mixed with listings of other programs were shown when I tried to download them.

The scales of signal strength of reception were always at 100 per cent. – **Southwick, Sussex.**

● It is necessary for Acorn Teletext Adapter owners to use a program called Patch2.

Download it using the instructions in the manual. Type *DISC or *TAPE then RUN. A file named TSOFT will be saved.

Type *RUN TSOFT and the file is loaded and run. The screen will flash and the cursor will move to the top of the screen.

To download any other program type *PAGE [number] followed by the appropriate instructions given in the Ceefax magazine Info which at present can be found on Page 702 of Ceefax.

Foreign languages

IN reply to Mr Hayward's request for a word processor for foreign languages (in the May issue of Micromail) you said that you did not know of one.

May I refer you to the November 1984 issue of your own magazine in which you carried out a review of our foreign language text processing system BBtype?

This was followed up by correspondence in the February 1985 issue which clarified further points.

I am happy to report that BBtype is alive and well and still selling in the education market – particularly on Econet systems – as a cheap and cheerful introduction to word processing.

We have been in touch with Mr Hayward and are able to provide him with a customised version for the daisywheel of his choice.

BBtype will work on Acorn Master and we can supply an ADFS version on request.

Also our ubiquitous BBkeys will also fit the Master after a small amount of surgery on the flap which goes under the plastic strip.

On that point I wonder why Acorn issued the Master with lots of paper strips for the function keys instead of doing a reprinted BBkey as it did with the Z80 processor? – **Simon Furey, Furey Enterprise Products, 7 Manor Park, Froxfield, Nr Marlborough, Wiltshire SN8 3LF.**

● Thanks for bringing our attention to BBtype. It's very difficult to keep track of what every product is capable of, particularly when going as far back as November 1984.

Splashing out . . .

In response to J.F. Truscott of Luton (Micromail May 1986) I have made this splash. I hope it is what he wants:

```
10 FOR I%=15 TO 0 STEP-1
20 SOUND 0,-I%,20,2
30 NEXT I%
```

– **J.A. Blackford, Hoddesdon, Herts.**

Letters Mastered

IN the April Micro User *you published a letter giving a listing to print large sideways letters. Unfortunately this program did not work on the Master Series so I set to work and wrote this:*

```
   10 REM**SIDEWAYS PRINT**
   20 REM**ON A MASTER 128*
*
   30 REM
   40 MODE 0:REM EASIER TO
SEE BIG LETTERS
   50 PROCbig("MESSAGE"):RE
M ENTER YOUR MESSAGE
   60 END
   70 DEFPROCbig(A$)
   80 VDU2
   90 LOCALS%:FORS%=1 TO LE
N(A$)
  100 ?&80=ASC(MID$(A$,S%))
  110 A%=10:X%=&80:Y%=0:CAL
L &FFF1
  120 MASK=128
  130 FOR BIT= 1 TO 8: P$="
"
  140 FOR BYTE = &81+6 TO &
81 STEP -1
  150 D=MASK AND ?BYTE
  160 IF D=0 THEN P$=P$+"
      " ELSE P$=P$+"*****
*****"
  170 NEXT BYTE
  180 FOR P=1 TO 8:PRINTP$:
NEXT P
  190 MASK=MASK/2
  200 NEXT BIT
  210 NEXT S%
  220 VDU3
  230 ENDPROC
```

I hope that this can help some Master users in their struggle against incompatibility. – **Kieran Mockford, Clacton-on-Sea, Essex.**

Moving Wordwise into View

£10 Prize letter

ON the original BBC Micro transferring a Wordwise file into View was a relatively simple process.

You simply loaded the file into Wordwise, saved it using the Spool option (option 8), entered View and then loaded the file into View in the normal way.

For some reason this will not work on the Master 128. If this method is used you only get a couple of odd characters in View.

However all is not lost. The editor on the Master comes to our rescue.

Load your text file into Wordwise in the normal way and use option 8 to Spool a new file out to disc, as in the old method.

*Enter the Master's editor with *EDIT and select f2 to load the spooled file into the editor.*

Once the file is in the editor remove any odd elements of text you may find as some of these seem to upset View if they are left in.

Select f3 to save the text file back to disc, with a new name if you wish.

Enter View either through Shift + f4 followed by W. Return, or by f1 followed by W. Return and load the final file saved into View in the normal way.

At first glance this may seem a long winded way of transferring files from one to the other. Once you have done it a few times though it is quite simple. – **Mike McNamara, Dunstable, Beds.**

Secret transfers

I HAVE a BBC Model B, Acornsoft View A2.1 and cassette-based printer driver generator and recently added a Watford DDFS and UFD twin disc drive to the system.

Having experienced difficulty in transferring the Juki driver *from cassette to disc and failing to relocate *TOSCRN and MPRINT I was interested to read in April's* Business Micro User *of the ease with which Rory McCloy can transfer these programs.*

What's the secret? – **David Miller, Brandon, Nr. Coventry.**

● The Acornsoft Printer Driver cassette is not protected and is designed for use on disc.

In fact for convenience I transferred mine from cassette to disc using the *TAPEDISC command on my Disc Doctor ROM.

I suspect you may be having problems with the load address of the files. The level of PAGE in your BBC Micro may be high because of your added DDFS.

Find out the LOAD address and length of the files using *OPT1,2. Try the following:

```
*TAPE
*OPT1,2
*LOAD JUKI4 1900
*DISC
*SAVE JUKI4 1900+100 400
400
```

This will save the printer driver Juki4 whose length is &100 bytes with a load address of &400.

TOSCRN and MPRINT can be transferred in a similar fashion and their load addresses are &2C00 and &C00 and lengths &400 and &BA respectively.

Don't forget TOSCRN loads the printer driver screen (load at &400, length &100). – **Rory McCloy.**

Scratch that space

IN your April 1986 issue you included a listing for an electronic note pad by Robin Nixon.

Seeing this as a very useful utility I set about entering it at the keyboard and on completion it was saved and then run. It scrolled on screen and when it reached the end I received the error message – Bad command at line 3960, which is CALL &FFF7.

I have checked the listing repeatedly as a result of receiving the same error each time it is run.

I then awaited the May issue in anticipation that the error was not mine. This not being the case I wonder if you can suggest possible causes for the error. – **G.W. Hetherington, Whickham, Newcastle.**

● Check lines 3920 to 3960 – especially 3930 – ensuring there's only one space between SCRATCH and the quotation mark following.

£10 Prize letter

FINAL WORD ON THE CITADEL

HERE is a complete solution to Superior Software's Citadel.

Go left to the West Wing (2,0), and take the orange and yellow key and make your way right to the Beach (4,0). Pick up the red and pink key and go to the top of the East Tower (3,5) via the orange and yellow door.

Go down the rope and get the Energy. Go back up the rope and go right until you are on the edge of the tower.

Jump off the tower leftwards and keep falling left until you get to Top of Castle (2,3) – press Escape before you hit the ground.

Now keep left pressed until you fall on to the blue wall. Go left and knock the switch.

Head towards the red and pink door in the Cellar (1,1), then go right and pick up the ice crystal. You should now head back up to the top of the East Tower. Go down the rope and get the green and light green key.

Go back down the ladders until you get to the East Wing (3,1). Hop on to the lift and jump off it when it is at its highest point. You should now find yourself in the gap just above the mask.

If you go left you will be able to open the green and light green door. Knock the switch and go straight to the bottom of the Well (2,4). The water should be frozen.

Jump up to the gap on the right and go in to the next room. Before you is crown no. 1. Pick it up and drop the ice crystal. Go back to the bottom of the Well (2,4) and pick up the Energy and the Egyptian head.

Go up the Well until you get to (2,0). Now go left to the Central Castle (1,0) and pick up the pink and white key. Go to the Wasteland (5,1), picking up Energy on the way.

Carry on to the Mountains (17,1) and pick up the cannonball. Now go into the Pyramid (14,1), drop the Egyptian head and pick up the grey bone. Go to the Witch's House (7,1) and drop the pink bone (keep the green and yellow key).

Go up the West Tower (3,3) and open the green and yellow door. Go up the ladder to (3,4) and get the Energy. Climb the rope to the top of the West Tower and pick up the green skull.

Fall off the east side of the tower – you should land at about (2,3). Go to the Kitchen (1,2) and drop the green skull. Then go to the Arena (1,1) and drop cannonball.

Retrace your steps to the screen left of the Central Castle (1,3) and get on the lift. Jump off it rightwards when it is at its highest. You should land on the Central Castle (0,3).

Go through the door with a C on it and get the crystal. Go back through the door and jump off the castle rightwards. If you timed your jump you should pick up the Energy.

Now go through Thorn Maze (0,2) to the West Wing (1,2) and pick up the gunpowder. Go to the Arena (1,1) and pick up the cannonball you previously dropped. Drop the crystal and go down the Well to (2,2).

Go into the little cranny at the bottom right and walk off the edge rightwards. Keep right pressed and you will find yourself in an alcove. Now aim for the other alcove on the left. From here you should be able to jump to the ledge on the right.

Continue right and you will find the Lab (3,3). Walk over the cannon twice and it will fire your cannonball through a wall on the next screen.

Carefully continue right to the Lab (5,3) and get the crystal. Go back to the start (the Main Hall (0,0)) and drop the crystal.

Go left to the West Wing (3,1) and get the blue and white key. Go up to the next screen (3,2) and get the trampoline. Go to the Central Castle (0,1) and open the blue and white door.

You should now return to the Cellar (1,1) and go left to (2,1). Get the blue and light blue key and drop the trampoline.

Keep bouncing until your head hits the roof, then aim to bounce for the corner between the roof and the pillar support.

When your head hits this press up and jump. You should find yourself inside the stone.

Walk left until you go off the screen and see what Superior Software means about "The three crowns being craftily hidden" as you are confronted with crown no. 2.

Pick up the blue and light blue key again and then go back to the Cellar (2,1) and pick up the trampoline. Now go right to the Prison (3,0) and open the blue and light blue door. Go in and drop the trampoline.

Go back to the Central Castle (0,1) where you opened the blue and white door. Carry on left until you get to the Freezer (2,1) and go right taking the bottom passage.

Keep going right and you will end up in a little room in the Central Castle (0,1). Pick up the crystal and go back to the Freezer (1,1) and get the chicken and go to the Kitchen (1,2) and drop the chicken under the fireplace where it will be cooked by the fire.

Pick up the chicken and crystal again and go to the Temple (12,1) on the island (which is past the ocean). Go right to (13,1) and go on to the table and drop the crystal.

It will now appear in the Sanctuary (12,2). Now go to the other side of the island and get the green Egyptian statue and return to the Citadel.

You want to go to the Prison (3,0). When you are there bounce on the trampoline until

→

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you get on to the chain. Go up and get the Egyptian head. Go down and get the Energy.

Go to the Pyramid (14,1). Go down until you get to a screen like (14,0) and drop the Egyptian head. Go down again to (14,3), walk across the tomb and you will get a crystal.

Return to the Arena (1,1). Get the crystal and go to the Temple (13,1). Drop the crystals and go to the Prison (3,0) and get the trampoline. Go up to the East Wing (3,2) and pick up the pink bolt.

Go to the Witch's House (7,1) drop the trampoline, bounce on to her roof and go down the chimney. Go right to (6,0) and drop the bones in to her cauldron. Now go back to the Kitchen (1,2) and pick up the green skull.

Go back to the Witch's House (6,0) and drop the green skull into the cauldron. The witch will frazzle up. go down to (6,1) and get the crystal and go to (7,0).

Shoot the monk on the ladder and jump into the top right hand corner. Again you should find yourself in the stone – go left and pick up crown no. 3.

Go back to the Main Hall (0,0) and pick up the crystal. Go to the Temple (13,1) and drop the last two crystals.

Now go right to the Star Port (13,2) and go on top of the table. You will be teleported to the alien planet. Note that on the planet there are a new set of coordinates.

Go right to (1,0), then go up to (1,1), then left to (0,1), pick up the red and white key and go right to (1,1), down to (1,0), then left to (0,0).

You should now be back at the teleport system. Go left under the table to (1,0). Find a way to the red and white door and open it. Go left to (2,0) and pick up the jewelled figurine.

Return to the Star Port (0,0) and go on top of the table – sit back and watch the show. – **Rohan Smith, Marton, Middlesbrough.**

● We are grateful for this solution. Perhaps it might generate some more interest from readers who have given up the game in frustration.

Glowing limit

I HAVE enjoyed playing Citadel by Superior Software, but have almost battered my brains out trying to find out how to stop the glowing ball on the far right hand side of the island.

If you can tell me please do so before I do myself some irreversible damage. – **Kevin Crocker, Totton, Southampton.**

● The screen with the glowing ball is the furthest right you can go.

No matter how hard you try you won't be able to get across the screen without being killed.

Speedy service

I NOTE with interest the comments re Solidisk and I would like to add mine. Several of us – members of the Droitwich Amateur Radio Club – have had dealings with Solidisk and whenever we have asked for help or information we have always received it promptly.

For instance I was unfortunate inasmuch as a faulty DFS board got through their

And finally, with tongue firmly in cheek . . .

Listing at the Ram and Buffer

Dear Trev,

My apologies for not writing before but things have been rather hectic recently and it's all Clive's fault.

Every year the Rogues hold the ZX81 Memorial Meeting, an excuse for a drunken evening that ends with everyone agreeing that it was much more fun when we only had 1k. (I suspect that's all some of us have anyway.) It's great fun, or it was until this year.

As the result of lengthy negotiations involving barrels of beer I'd managed to get the whole of the Beeb team to attend the meeting. It was my job to write the words for the poster and Clive's (who understands GCOL3) to do the actual art work.

The trouble was that where I put "Dress Optional" Clive decided to put "Fancy Dress Only" on the grounds that he fancied seeing people in dresses. (He was in one of his more liquid states at the time.) Sometimes I wonder if he's got the full RAM.

Of course everything would have been all right if Andrea hadn't heard of it and decided to help with the organisation.

"What can I go as?" I wailed.

"How about a bug?" she retorted nastily.

"No", interrupted Clive, "He's got to dress up like the rest of us. And he can't let the side down. The Beeb team are coming down and we don't want to be shown up".

"What are they coming as?"

"Listings".

"Listings?" I queried.

"Well that's what they say. Just take them to the bar and soon they'll be listing".

I spent weeks worrying about it all. What if a bug meets a debugger? I needn't have bothered. It was all much worse than I imagined. The sight of the people arriving at the Ram and Buffer was enough to drive a man to drink.

Especially when I was the back end of a double disc drive, with A at the front I had a pretty bad time explaining to a very nice young man that his idea of 40/80 switchable was a misconception.

The crowd was amazing. There was one guy in a flying helmet and wings claiming to be Baron Von Ribboncable, squirting everyone with a water pistol.

Mind you, he was fairly sane compared to what came to be known as the communications section. These consisted of a pair of modems vainly trying to make contact. Telephone Bill – who'd come as a wrong number and had an arm round a delectable RS232 interface he insisted on calling his "parity bit" – said they needed hardwiring. I'm not sure what this meant but at the mention of packet switching I left them to their baudy games.

By this stage I'd separated myself from A (who'd just intimated that I needed a separate power supply) and mingled. I would have gone for a dance but at my age you've got to be careful of disc problems. In the event I made a BBC line straight for the pretty young thing from the Nice Byte who'd come dressed as a User Port.

Unsurprisingly she was surrounded by all sorts of peripherals all wanting an acknowledgement. Before I could get to her, however, I was intercepted by the Beeb Team (listing to a man) who showed me Mike Cook's latest invention. It's a device that not only unfailingly points in the direction of the nearest bar, but also helps you track down the bottles people have hidden away at parties.

Before we could test it out Clive, dressed up as a mouse, announced the party games. The first was a bit of a failure. You had to think of an advert for the BBC Master that was even more boring than the ones in the papers. No one could.

The second was much more of a success. It was a variant of one of those maze games where you rush round gathering up energy pills. Only in this case it was alcohol and, through the screens, getting caught didn't sound as bad as it might be.

About the last thing I can remember was when someone wanted to play Hopper on the bypass. And after that a vague memory of seven dwarfs, each with an interface lead over one shoulder, marching in singing "I/O, I/O, it's off to work we go". It was then I suffered a disc fault and was taken home.

Cheers,

Bob

quality control and I received it.

When I telephoned them they could not do enough to rectify the matter. One was despatched by special post and I received it the next day. No one can give or get better service than that.

I am a licenced radio amateur and it was very nice to see the letter from Philip Bridges. Computers are taking quite a big part in amateur radio now.

Several of us in the Midlands area would only be too pleased to set up radio links with other licenced amateurs in any part of the country or world for that matter by RTTY – packet radio-phone-CW. on any frequency. – **William E. Cotton G4PQZ, Droitwich.**

Crashproof Romspell

I HAVE a copy of Watford Romspell version 1.02 and have also used Spellcheck II.

I wish to take issue with one of your comments regarding the Watford offering. I got version 1.02 in December 1985 and it does not crash with words over 16 letters.

Not having experienced any problems with Romspell I tested it with the word Supercalifragilisticexpialedocious and again it did not crash.

I find on entering this in the dictionary that only the first 22 letters had actually been added. This was repeatable with other words.

However no hint of a crash occurred and it is unlikely that you would find many valid words this length or try to add them to the dictionary.

I think that Spellcheck's limitation is that only 600 odd words can be added to the user dictionary – if you are dealing with a major technical publication this can be a limitation.

In terms of speed I don't think that there is a lot to choose between the two products. I believe that you can add words ad infinitum to Spellcheck II up to the capacity of your disc drive.

Also you are sunk if you lose or damage Romspell dictionary disc but with Spellcheck II you can initialise an empty dictionary. Happily both dictionary discs can be backed up.

I would suggest that a major improvement to spelling checkers for the BBC Micro would be to handle the many variations of a word, such as produce, producer, produced, producers, or does, doesn't.

At present these are all separate words on both the checkers reviewed. It would be useful to allow "words" such as 't or n't as this could cut the need for a large dictionary.

I have tried writing my own spelling checkers in Wordwise Plus' own language. They work but speed is of the leave it running and go to bed variety. I therefore appreciate the immense problems that the writers of products such as these have had to overcome. – **Peter G. Dunkley, Guildford.**

Emulating Break

I HAVE a Volex Teletext ROM fitted in my BBC B. At switch-on it claims workspace with the result that some programs fail to run properly.

*This fact is documented in the instruction manual and the cure is to disable the ROM with *ROOM [Return] then Break.*

Can you please tell me how to emulate Break in a boot file? – **A.F. Wheeler, Tunbridge Wells, Kent.**

● The nearest you can get to emulating Break is to:

```
CALL !-4
```

However this will close the boot file from which the CALL statement was issued.

This problem can be solved by setting function key 10 up so that it performs the next operation required:

```
*BUILD !BOOT
*KEY10 CHAIN"MENU"|M
*ROOM
CALL !-4
```

This example should claim back the memory used by the Volex ROM and CHAIN the file named MENU.

Whatever you give in the *KEY 10 definition will be executed when the RAM has been claimed back.

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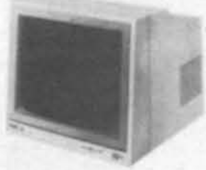

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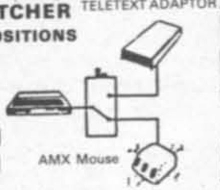

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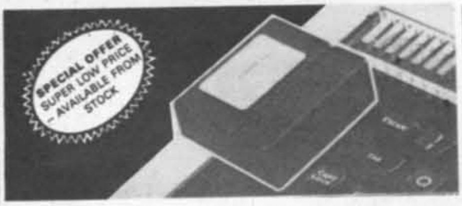

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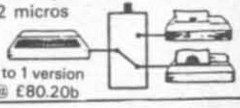

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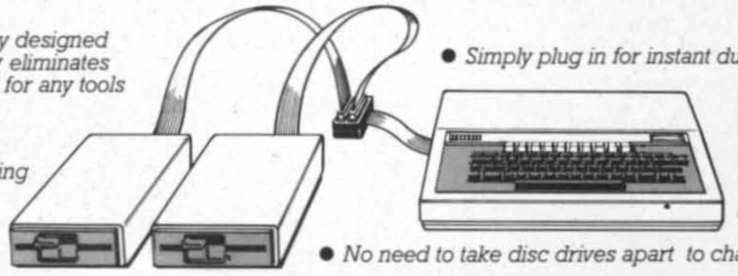

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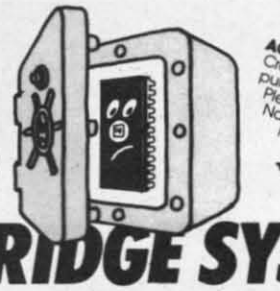

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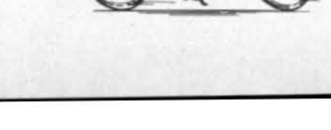

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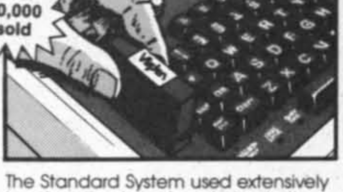

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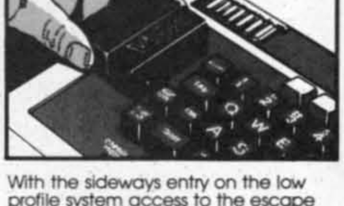

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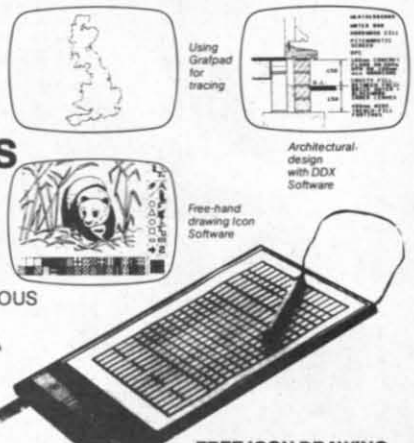

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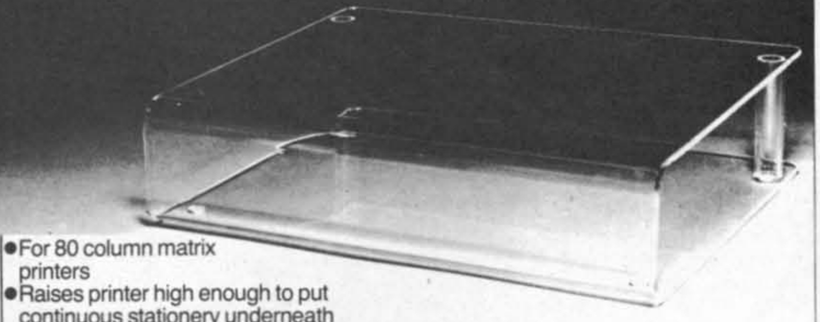

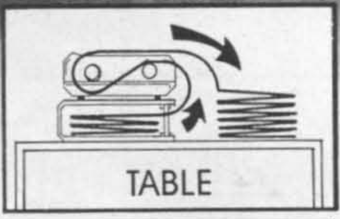

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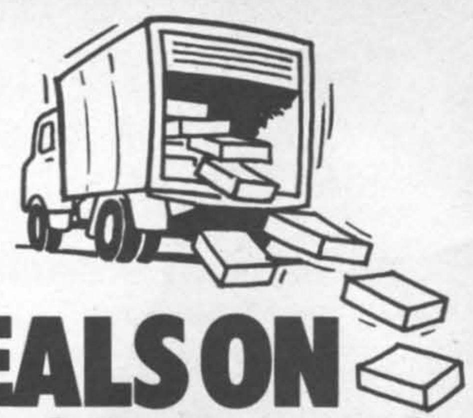

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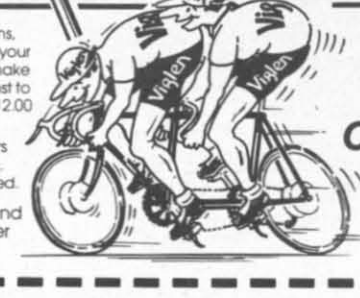

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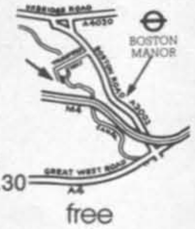

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£119

(400K 40/80 TRACK)

INC. VAT

Latest Acorn 1.2 DFS (DNFS) Call at factory for free fitting. **£59** (with disc drive only)

Single Drives 40/80 400K	
Single Drive	**£119.00**
Drive + Acorn DFS	**£178.00**
Integral PSU for Single Drive	**£22.00**

Dual Drives 40/80 800K	
Dual Drives	**£238.00**
Dual drive + Acorn DFS	**£297.00**
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All offers include

Utilities Disk includes formatting, verifying, BASIC program comparator, disassembler, Epson screen dump, dual catalogue (giving 62 files), large printing and many others.

Comprehensive Manual a fact-filled, 56 page document, includes techniques of loading from cassette to disk. Not available elsewhere

Carriage. Add £12 in each case. Usually despatched next day. Price covers courier-delivery and insurance. Prices include VAT.
Prices correct at time of going to press – Offer subject to availability.

Sales Hotline 01-843 9903
Please call for latest prices, product details and to place credit card orders. Government & Educational Establishments enquiries welcome on this number.

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Win on every count, with a Viglen Winchester Drive for your BBC Master Series 128k or BBC B or B+

100% ACORN ADFS COMPATIBLE

Price INC. VAT

20Mb Winchester with Acorn ADFS

£759 (40 and 80 MBytes also available, please call us.)

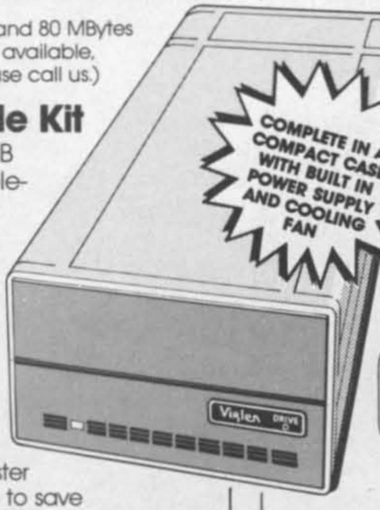
Acorn 1770 Upgrade Kit

Enables you to run your BBC B with the floppy discs in double-density ADFS Mode.

£49.95 INC.VAT

Compability

The Viglen Winchester is ready to plug in and use straight away on a BBC Master Series. On a BBC B or B+, you will need to fit the Acorn ADFS Rom. Viglen believe this is the only truly 100% Acorn ADFS compatible unit currently available. You can use up to two floppy disc drives in conjunction with the unit. Fit the Acorn ADFS to the B+ and the floppies can double their capacities by running in double density mode.



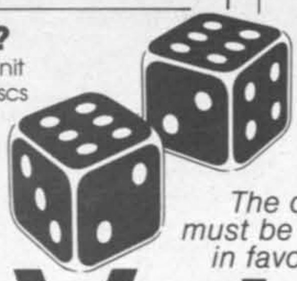
COMPLETE IN A COMPACT CASE WITH BUILT IN POWER SUPPLY AND COOLING FAN

Speed

The Viglen Winchester takes under 2.5 seconds to save 200KBytes, making it at least 10 times faster than the equivalent floppy disc system.

Memory

The Viglen Winchester is equivalent in capacity to two hundred 100K floppies or fifty 400K floppy discs.



What is a Winchester?

A Winchester Drive is a sealed unit containing one or more hard discs and works in principle like a floppy disc drive. The discs are permanently rotating at high speed so giving a much faster access time. The discs cannot be changed, but with such a vast memory capacity, it is not usually necessary to do so.

How to order

Simply fill in the coupon below. Remember to add £12.00 carriage, packing and insurance, and allow seven days for delivery. Credit Card holders may order by phone.

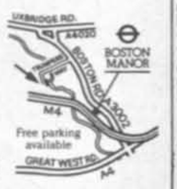
The Viglen Winchester Unit consists of the following:

1 Winchester Drive, Controller Board and special designed power supply and fan – all fitted in one compact case.
2 Acorn ADFS Rom **3** Acorn ADFS Manual
4 Acorn ADFS Utility Programs
5 Winchester User Guide
6 Additional Utilities on the Winchester including Formatter and Verifier.

The dice must be loaded in favour of

Viglen

Showroom open
Mon – Fri 9.30-5.30
Saturday 9.30-2.00



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Viglen Computer Supplies, Unit 7, Trumpers Way, Hanwell, London W7 2QA.
Official Orders from Educational Establishments, Government Departments, and Plc Companies accepted.

Please send me (quantity)____ Winchester Drives. I own a ☐BBC B, ☐B+, ☐Master, ☐BBC B with 1770 DFS ✓ **Tick**

I enclose Cheque/P.O. to VIGLEN COMPUTER SUPPLIES for £................ add £12 for p & p and insurance.

Name..

Address.......................................

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I prefer to use ACCESS/BARCLAYCARD (delete as necessary).

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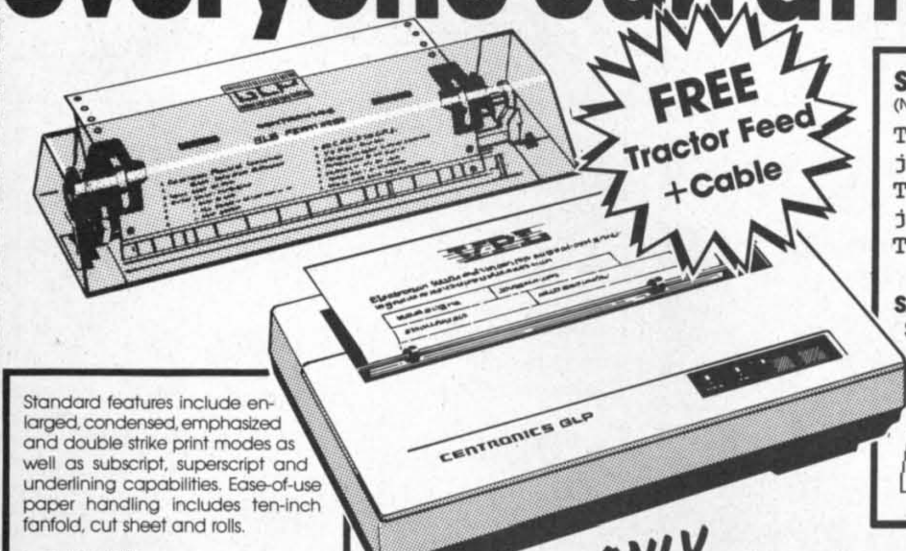
The Great Little Printer from Viglen at a price everyone can afford

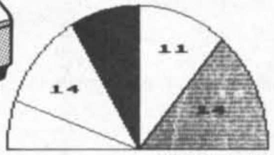


SAMPLE OF NLQ
(NEAR LETTER QUALITY)

```
The quick brown fc
jumps over the laz
The quick brown fc
jumps over the laz
The quick brown fc
```

ACTUAL SIZE

SAMPLE USING EPSON SCREEN DUMP



NOT ACTUAL SIZE

Standard features include enlarged, condensed, emphasized and double strike print modes as well as subscript, superscript and underlining capabilities. Ease-of-use paper handling includes ten-inch fanfold, cut sheet and rolls.

```
1.ELITE MODE.
  ( 12 characters per inch )
2.EMPHASIZED MODE.
3.DOUBLE STRIKE.
  (Characters printed twice)
4.CONDENSED MODE. ( 17 characters per inch )
5.SUPERSCRIPT CHARACTERS
6.SUPERSCRIPT CHARACTERS CONDENSED
7.SUBSCRIPT CHARACTERS
8.SUBSCRIPT CHARACTERS CONDENSED
9.ITALIC CHARACTER SET.
```

ONLY

£149

INCLUDING VAT

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Showroom/Factory open
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- **All printers come standard with parallel interface**
- **12cps Near Letter Quality**
- **Normal 50cps draft printing**
- **Separate tractor and friction feed**
- **Logic seeking head**
- **Uses normal A4 sheet paper or continuous stationery**
- **Original plus two copies**
- **48 International characters**
- **Subscripts, superscripts and underlining**
- **Also available for IBM.**

Viglen
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THE BEST PARTNERS FOR YOUR COMPUTERS

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Credit Cards valid only if signed by the card holder. Address on coupon must be same as card holder.

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Please send me (qty) ______ GLP printer(s).

I enclose Cheque/P.O. for £ ....
add £8.00 for carriage and insurance.

Tick ✓ whether ☐BBC or ☐IBM

Name..

Address.......................................

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I prefer to pay by ACCESS/BARCLAYCARD
(delete as necessary).

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Signature.....................................

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Please Phone For Latest Low Prices!

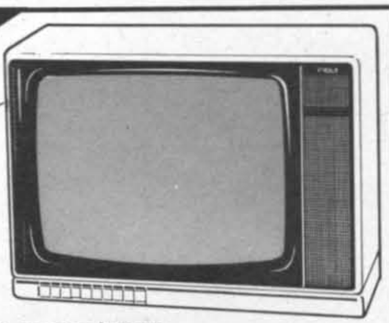
All the peripherals for your BBC Model B

the best service – the best value

Monitors

NEW

PHILIPS Colour TV/ Monitor Model 1114



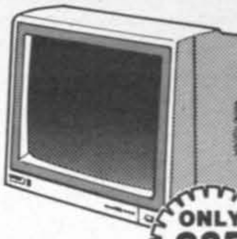
14" Tube (V34cm) Receiver/Monitor

- Light and compact finished in white with dark picture surround.
- In-line 14" picture tube provides a sparkling picture in seconds.
- Designed to give exceptional reliability and performance.
- 10 pre-select channel buttons.
- Headphone/tape recorder socket with separate loudspeaker mute switch.
- Loop aerial and main aerial connection.
- RF, CVBS and RGB inputs.

MODE TV AV
AUDIO IN — OUT
VIDEO IN — OUT
RGB

Price **£199** inc. VAT

PHILIPS Model BM7502 Green Screen Mono



From the highly successful 'Philips 80 Range', here is a monitor specially designed to display graphics and alphanumeric data with perfect clarity.

- 12" high resolution, 20MHz band width, anti-glare screen.
- Composite Video (CVBS) and Audio Input.
- 2000 character (80 x 25) display.
- Amber screen – £6 extra.
- Ideal low price for your BBC B.

ONLY **£85** INC. VAT

PLEASE ENQUIRE ABOUT OUR EXTENSION KEYBOARDS, KEY PADS & EPROM PROGRAMMER

PHILIPS NEW **Colour Monitors Model CM8501**

- Std resolution.
- Grey glass screen.
- RGB – linear/TTL – inputs (SCART/8 Pin DIN).
- Audio input.
- Bandwidth 8 MHz.
- Adjustable foot.

Please call for latest low price

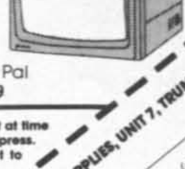
NEW

Model CM8533

- Med. resolution.
- Dark glass etched screen.
- Composite video input (phono).
- RGB – linear input (SCART).
- RGB/RGBI – TTL input (8 Pin DIN).
- Audio input.
- Green (Mono) switch.
- Bandwidth 12 MHz.
- Adjustable foot.

Price **£289** INC. VAT

Microvitec Monitors



Standard	**£219**
Med	**£289**
High	**£429**
Med & Pal	**£329**

Prices correct at time of going to press. Offers subject to availability.

Printers

Dot Matrix

Taxan Kaga KP810	**£249**
Canon PW1080A	**£279**

Daisy Wheel

Juki 6100	**£299**
Quen Data	**£199**
Epson DX100	**£359**

Please add £8 for 1½ metre length printer lead for the BBC micro.

BBC Master 128k £489 inc VAT

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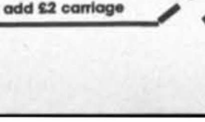
3M Scotch Discs
5¼" single-sided diskettes
Double density – Lifetime guarantee

10 DISCS PER BOX



	Per box
SS 40 TRACK	**£13.00**
DS 40 TRACK	**£15.00**
SS 80 TRACK	**£19.50**
DS 80 TRACK	**£22.00**

Prices include VAT

Please add £2 carriage

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Please add £8 carriage per item (except discs) ______ I enclose Cheque/P.O. for £ ______

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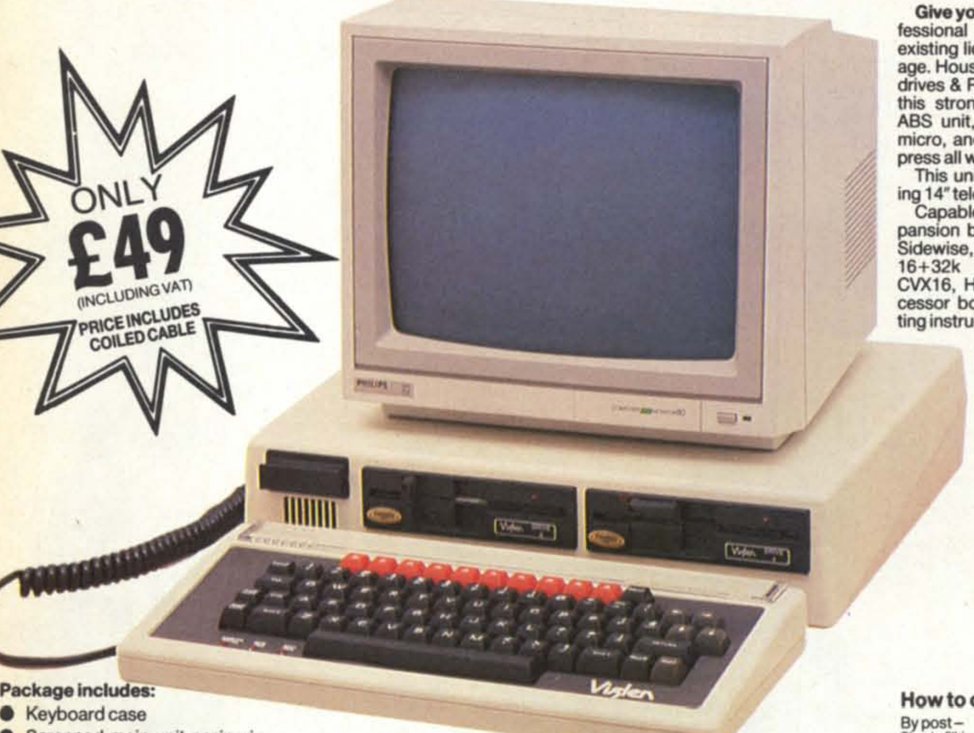
GIVE YOUR BBC THE PC LOOK

WITH THE Viglen PROFESSIONAL CONSOLE UNIT (P.C.U.)

ONLY
£49
(INCLUDING VAT)
PRICE INCLUDES
COILED CABLE


PHILIPS
Viglen
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Give your BBC Micro System the professional PC-look by replacing your existing lid with this smartly styled package. House your computer, monitor, disk drives & ROM cartridge system neatly in this strongly constructed, high impact ABS unit, colour matched to the BBC micro, and give yourself an outfit to impress all who see it.

This unit will support monitors including 14" television sets.

Capable of accepting most internal expansion boards such as Solidisk, ATPL Sidewise, Midwich 16, RAMAMP 16+32k Exprom, Computer Village CVX16, HCR Sideways, 6502 2nd processor boards. Fully ventilated. Full fitting instructions.

DEALER
ENQUIRIES
WELCOME.

Package includes:

- Keyboard case
- Screened main unit casing including internal fittings
- 2.0 metre coiled cable to connect main unit to keyboard
- Blanking plates included to blank out disk drive aperture
- Keyboard label

Accessories: (prices inc. VAT)

1. 2.0 metre coiled cable on its own £15
2. Dual-drive data cable £9
3. Dual-drive power cables £5
4. Special internal switch mode power supply kit capable of running two half-height drives cool £29
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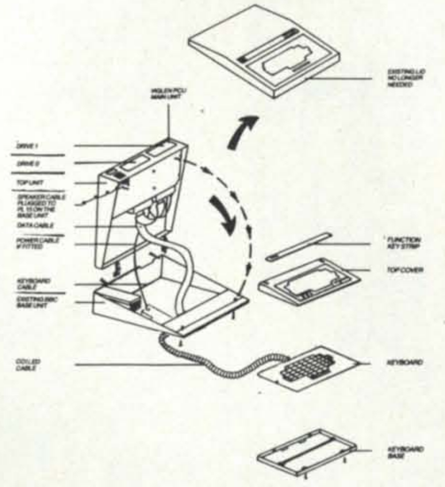
6. Fitting available from £15
7. Extension keyboard on its own £29
8. Also available with single or dual drives ready fitted .... *Price on Application*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DRIVE 1
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Viglen are also major supplies to educational and government establishments and welcome futher enquiries and orders.

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Tel: 01-843 9903
Personal callers:
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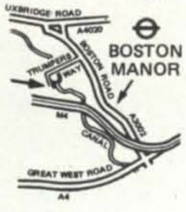
Saturdays
9.30-2.00pm.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Post to: VIGLEN LTD., UNIT 7, TRUMPERS WAY, HANWELL, LONDON W7 2QA. **Telephone: 01-843 9903**

Please send me______(Qty) VIGLEN PC Unit(s) Plus Accessories ______________________ State ref numbers

I enclose Cheque/P.O. for ______________________ Please add £6 for postage, packing and insurance.

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VISA

Some of the features of the new Mini Office II

With the word processor you can . . .
★ Select most features by menu or embedded commands. ★ Transfer records from database for personalised circulars. ★ Choose from three methods of display: 20 column (double size characters), 40 column, 80 column (20 and 80 columns only on 'B' Plus and 6502 Second Processor). ★ Centre, indent, tab, justify and merge text. ★ Insert, copy, move or delete blocks of text. ★ Select two editing modes: insert or overwrite. ★ Search and replace globally or selectively. ☆ Check typing speed in words per minute. ☆ See on-screen real-time clock, plus word and character count.

With the database you can . . .
★ Select five field types (Alpha, Decimal, Date, Integer, Formula). ★ Perform all arithmetic functions. ★ Search over multiple fields. ★ Mark individual records. ★ Use flexible printout routine. ★ Pass records to the word processor. ☆ Carry out powerful multi-field record sorting.

With the spreadsheet you can . .
★ Total rows and columns, with easy selection of criteria. ★ Copy formulae either absolutely or relatively. ★ Print out all or part of the spreadsheet. ★ Move directly to a specific location. ★ Select movement of cursor. ☆ Recalculate automatically or manually.

With the label printer you can . . .
★ Design any style of label with the versatile editor. ★ Select label size and sheet format. ★ Read directly from database files.

With the graphics pack you can . . .
★ Enter data directly or take from spreadsheet. ★ Use icon type menus. ☆ Choose pie chart, bar chart or line graph. ★ Display up to three line graphs simultaneously. ★ Display up to three bar charts side by side or stacked. ★ Choose bar charts in either 2D or 3D. ★ Draw compacted or emphasised pie charts. ★ Define your own style of shading. ★ Dump graphs directly to Epson or Seikosha compatible printer.

With the comms pack you can . . .
★ Access MicroLink or Telecom Gold with only two key presses. ★ Select protocols as required. ★ Change modes while on-line. ★ Store text directly to memory or disc. ★ Use one-key 'Stop' command.

With all the modules you can . . .
★ Use the AMX Mouse. ★ Choose foreground and background colour in most modes. ★ Make more efficient use of memory and faster response time thanks to machine code content. ★ Take advantage of the extra memory of the BBC B Plus and 6502 Second Processor.

★ **Features that were not in the original Mini Office.**

Database proudly presents.

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming – and at a price everyone could afford.

Since then it has become far and away one of the best-selling packages ever created for the BBC Micro, frequently displacing games from their position in the Top Ten. And, unlike most software releases, it is still as much in demand now as it was 15 months ago.

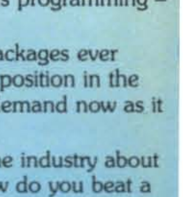
Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

The answer is – by making it even better! And the new Mini Office II is certainly that . . . in every respect.

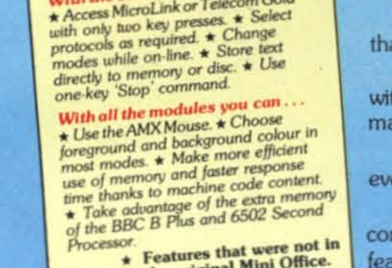
While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

The result is the most comprehensive suite of business programs ever produced for the BBC Micro – and still the best value ever.

And it comes with a no-nonsense easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.



It's a word processor . . .

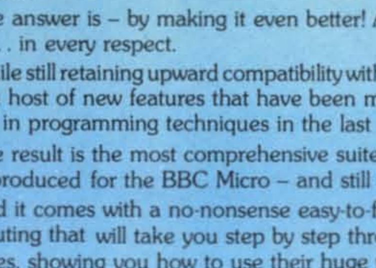


```
Mini Office II                Word Processor
           Word Processor menu

           Edit text
           Preview text
           Print text
           Clear text
           Search & Replace
           Catalogue
           Select Mouse
           40 character mode
           Merge text
           Save text
           Load text
           Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
        (c) Database Software 1986
```

It's a database . . .

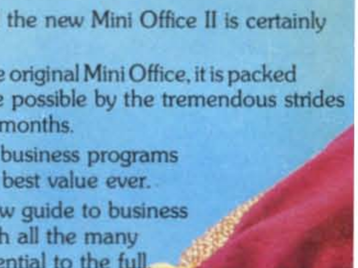


```
Mini Office II                 Database
             Database menu

           Edit data
           Load/Save/Print
           Search data
           Sort data
           Calculate
           Edit structure
           Select Mouse
           Clear data
           Clear all markers
           Toggle markers
           Hardware options
           Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
        (c) Database Software 1986
```

It's a spreadsheet . . .



```
Mini Office II               Spreadsheet
            Spreadsheet menu

           Edit spreadsheet
           Load spreadsheet
           Save spreadsheet
           Save graphics data
           Print spreadsheet
           List formulae
           New spreadsheet
           Alter screen display
           Catalogue
           Select Mouse
           Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
        (c) Database Software 1986
```

It's MINI OFFICE II on the BBC Micro! All 6 modul

Software

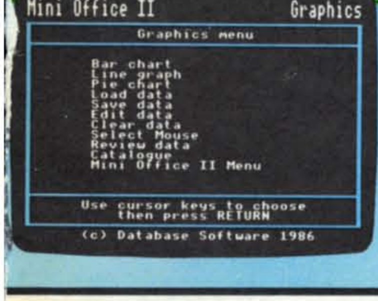
ORDER FORM ON PAGE 147

```
Mini Office II
Main menu

Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II

Use cursor keys to choose
then press RETURN
(c) Database Software 1986
```

It's a graphics pack . . .

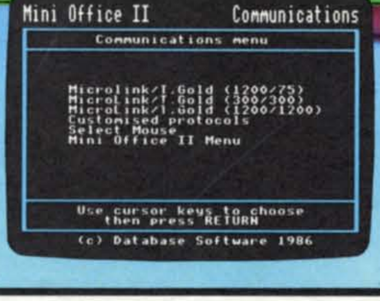


```
Mini Office II                Graphics
            Graphics menu

        Bar chart
        Line graph
        Pie chart
        Load data
        Save data
        Edit data
        Clear data
        Select Mouse
        Review data
        Catalogue
        Mini Office II Menu

      Use cursor keys to choose
         then press RETURN
     (c) Database Software 1986
```

It's a comms pack . . .

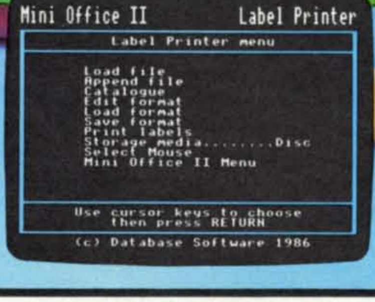


```
Mini Office II          Communications
         Communications menu

   Microlink/T.Gold (1200/75)
   MicroLink/T.Gold (300/300)
   MicroLink/T.Gold (1200/1200)
   Customised protocols
   Select Mouse
   Mini Office II Menu

      Use cursor keys to choose
         then press RETURN
     (c) Database Software 1986
```

It's a label printer . . .



```
Mini Office II           Label Printer
          Label Printer menu

      Load file
      Append file
      Catalogue
      Edit format
      Load format
      Save format
      Print labels
      Storage media........Disc
      Select Mouse
      Mini Office II Menu

      Use cursor keys to choose
         then press RETURN
     (c) Database Software 1986
```

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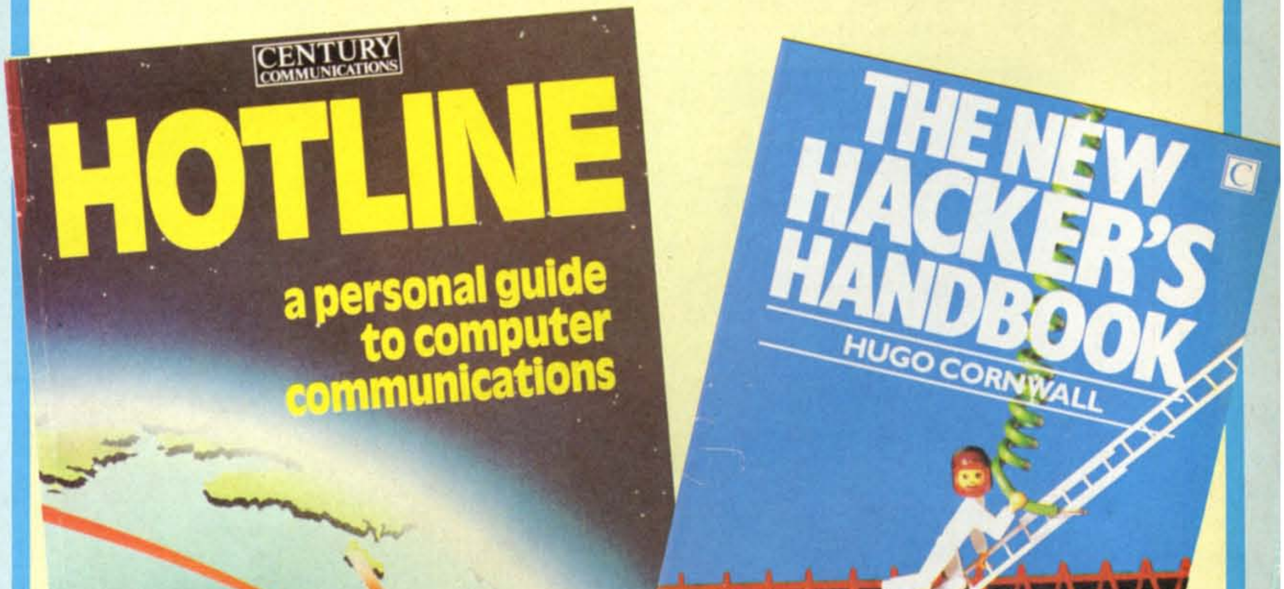
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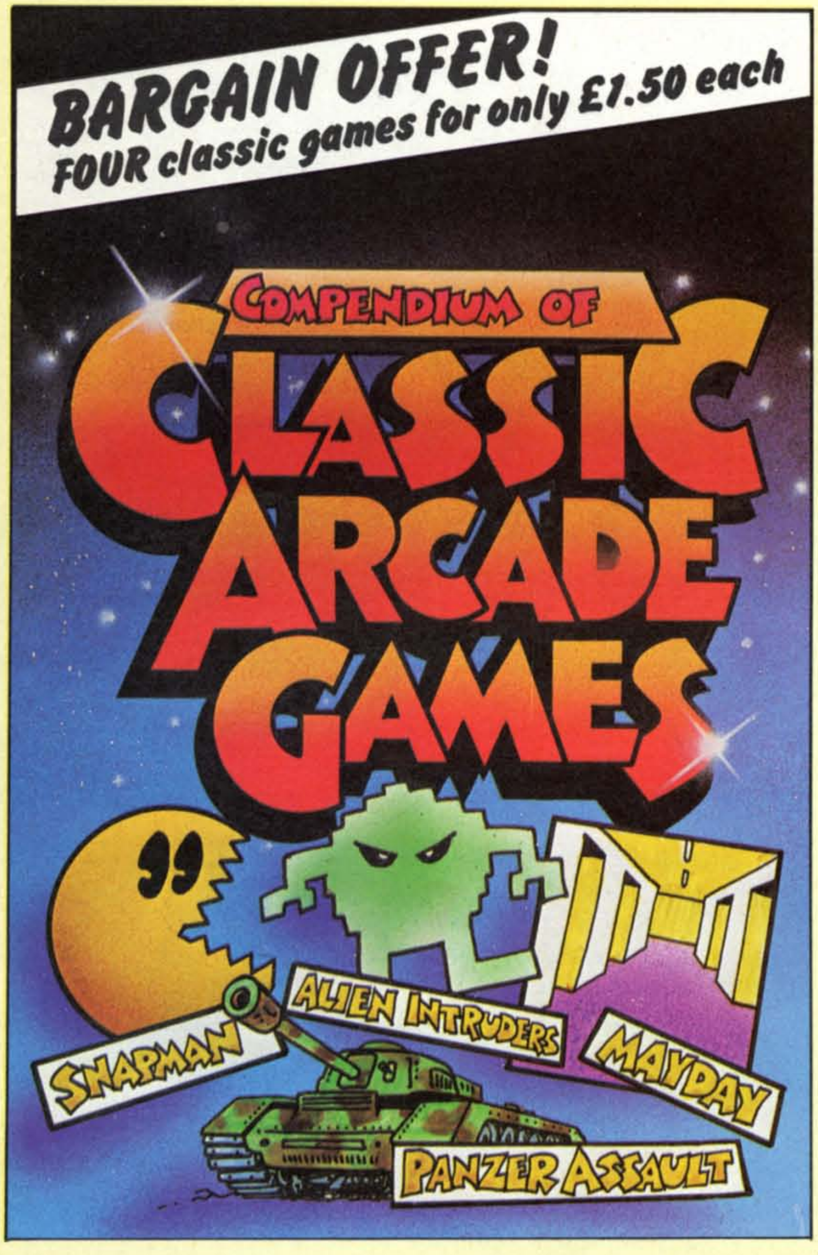
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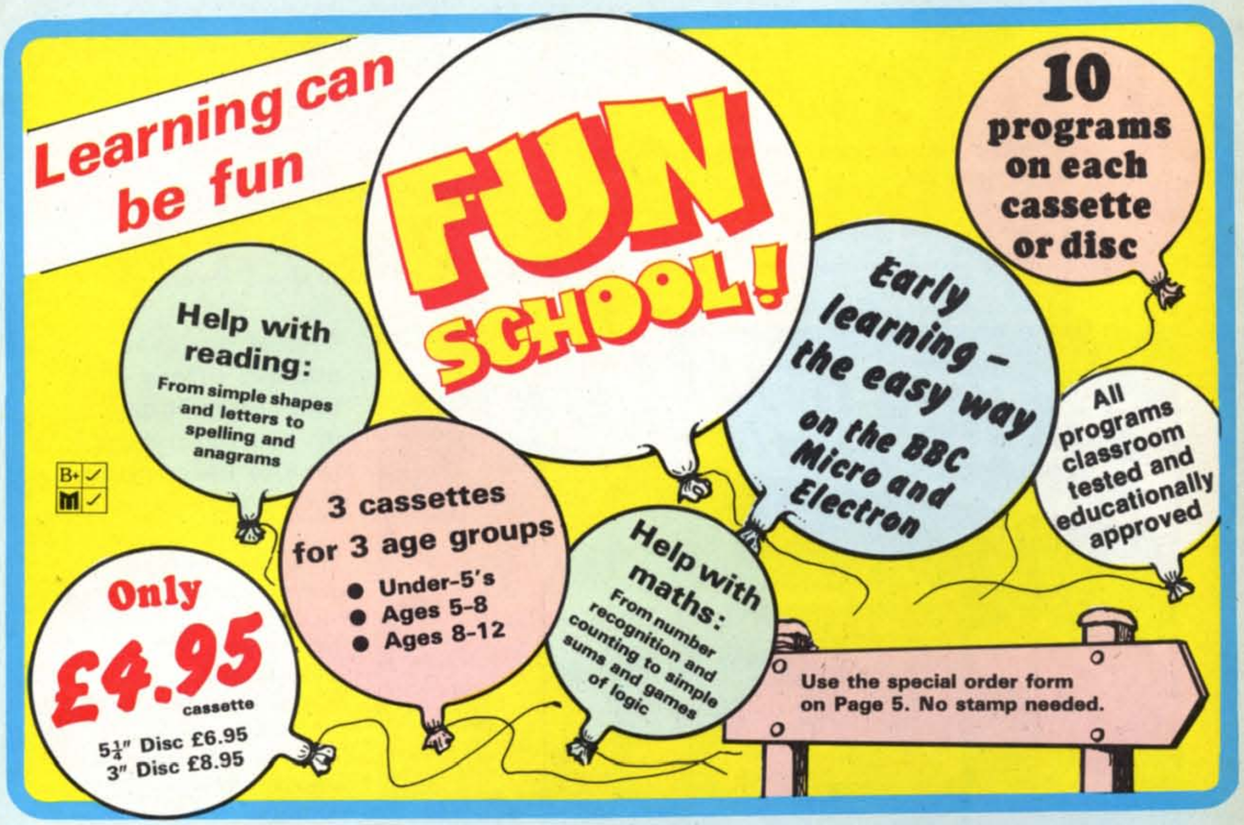
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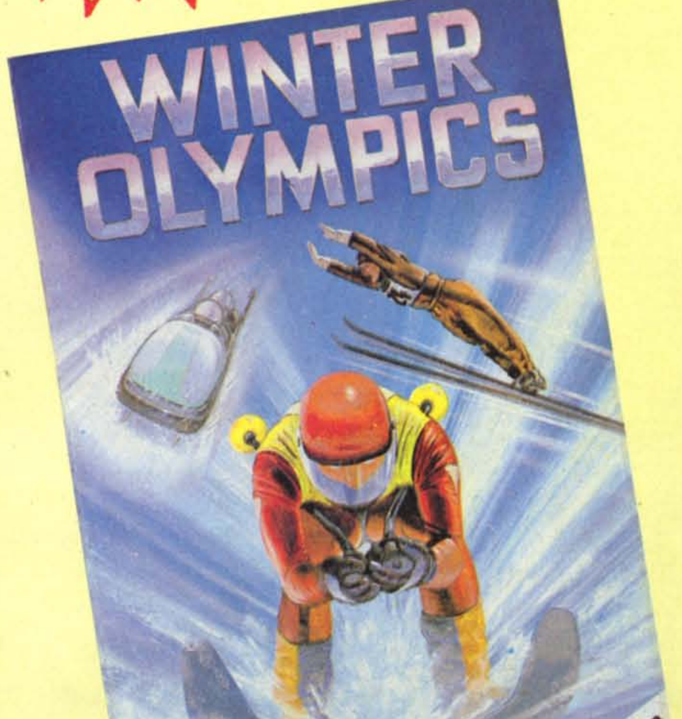

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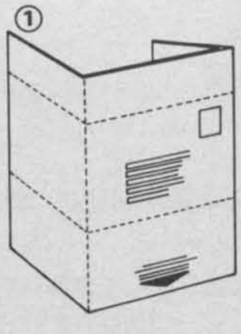

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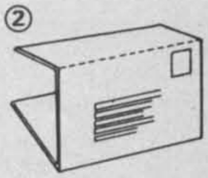

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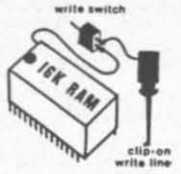

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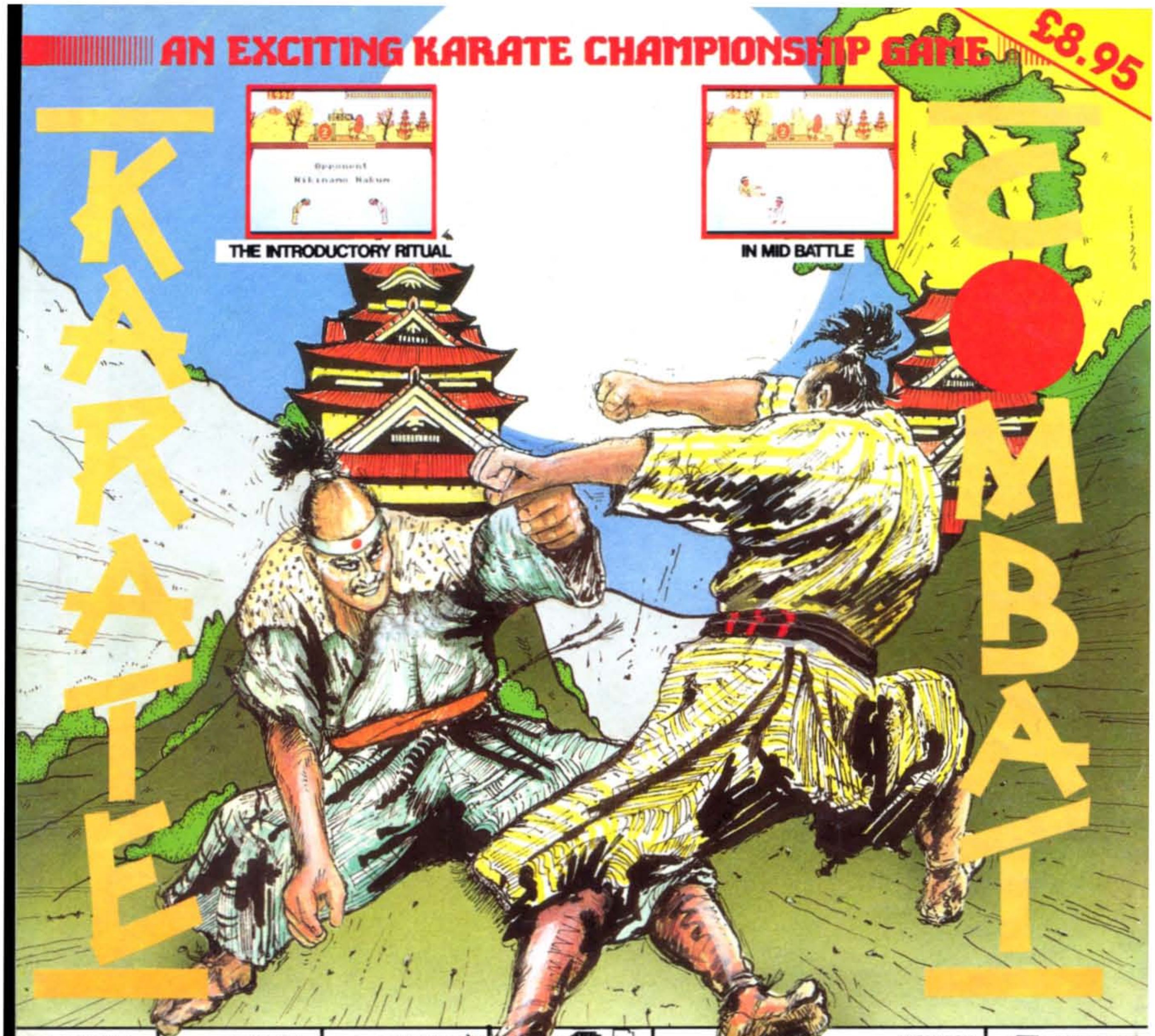
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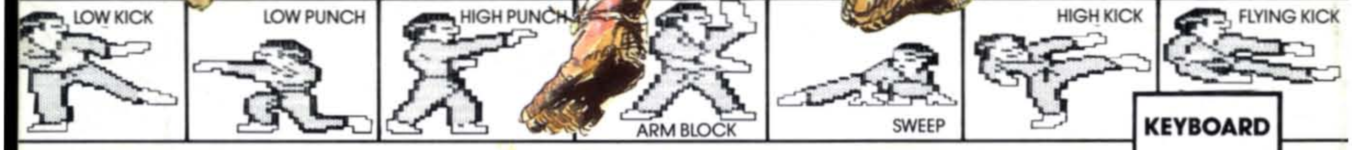
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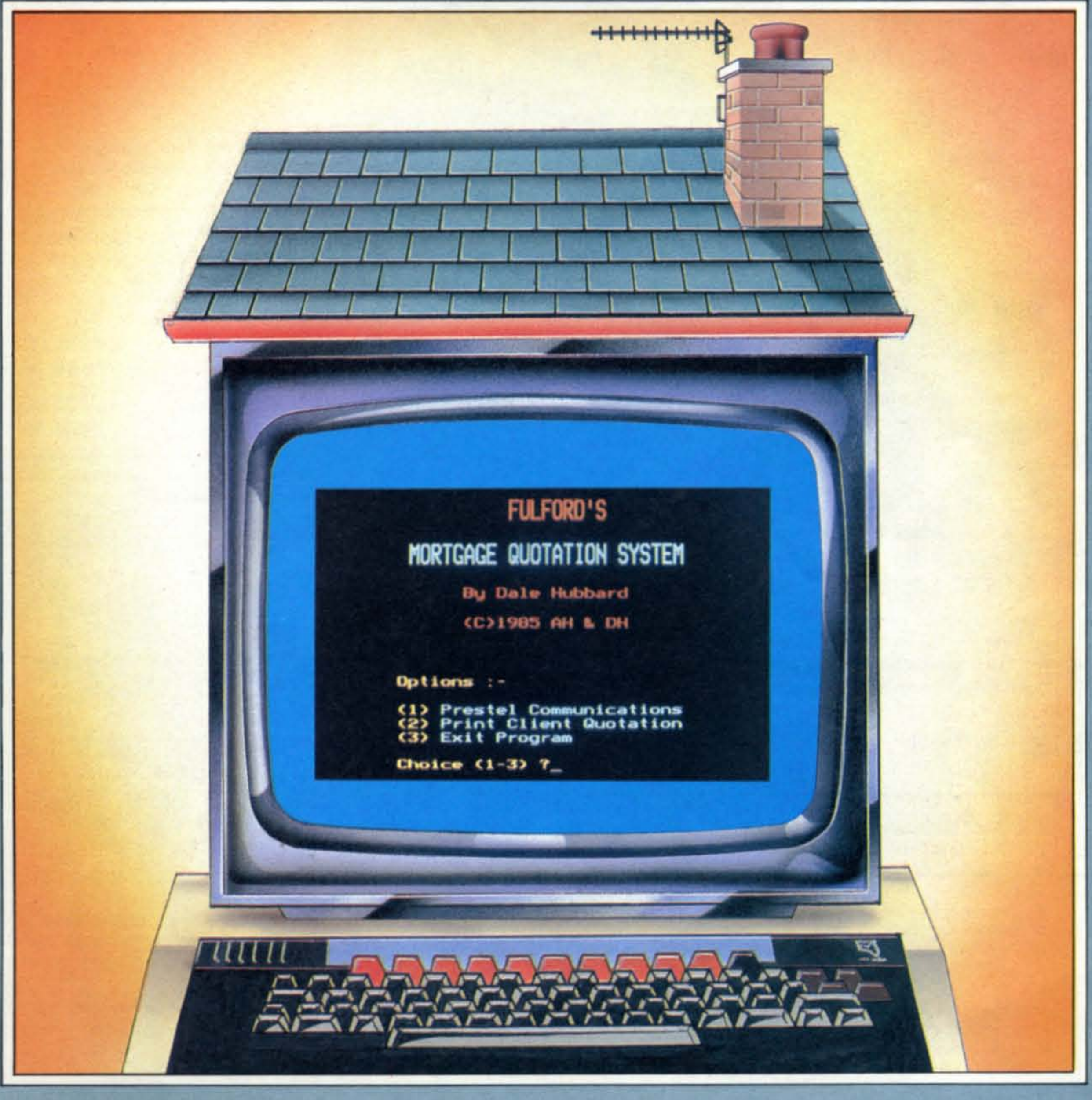
BUSINESS MICRO USER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TRADE ENQUIRIES INVITED

Taking a long hard look at software

WITH thousands of programs on the market *The Micro User* can review very few of the products that might take your fancy. Consequently I am devoting this month's column to the subject of reviewing business software for yourselves.

While accepting that no shop allows one to borrow a program for the 6 to 10 hours of testing which a major system such as this month's product requires, certain questions must still be satisfactorily answered every time you feel tempted to take out your chequebook. They are:

- Is the task appropriate for a micro?
- How long will it take to install and master the system?
- How much will the system cost – both directly and indirectly?
- How reliable will the system be?

After examining each of these in turn we will look at an unusual product to see them in actual practice.

The BBC Micro is a first rate micro, but we must remember its original purpose. It was not designed to be the most user friendly, most cost effective, most capable or most anything computer available – with one exception. I could suggest at least five examples of products which are significantly better than the BBC Micro for each of the parameters listed above.

The exception is that Acorn aimed to maximise the market potential and therefore made the BBC Micro suitable for the widest variety of applications. Consequently in designing the most flexible machine available at that time the BBC Micro became all things to all men.

Such flexibility makes many users believe it capable of tackling most commercial tasks. This is only partially correct, since there are systems I would hesitate to place on any micro and there are systems which are better suited to other micros.

What is more, further doubts have nothing to do with the speed, disc handling, keyboard or basic design of a BBC Micro but are based on the organisations using it.

Consequently when examining business software the first thing I have to decide is not whether it is performing its designated task well, but rather whether this task is worth bothering with. Although my misgivings can stem from a variety of sources there are four main ones:

- Too many systems are marketed which require several hours to set up and are used for only a few minutes a month. The effort to convert to micro is just not worthwhile. It is also easy to forget that a system which is infrequently used, and then only briefly, requires extra operation time due to lack of familiarity.
- Other tasks are unsuitable for businesses with a manager who is the only computer operator. Tasks such as cheque reconciliation can be delayed a couple of weeks in order that holidays may be enjoyed, though if nobody else can run the payroll the weekly staff will not wish you an enjoyable fortnight on the Algarve.
- Many systems, particularly stock and financial, are converted from larger, more powerful micros and the BBC Micro is not up to the task. The advent of the Master series may make this less of a problem.
- Occasionally tasks seem like a good idea, but in practice are rarely kept up to date once the novelty wears off. Some diary or personal memo systems fall into this class.

Using these criteria it is easy to understand why I can not recommend every user friendly, slick and reliable program sent for review.

Every firm develops its own way of working. A family concern founded by one's grandfather will not handle its buying the same way as one set-up a couple of years ago by a manager investing his redundancy pay-off. Consequently a purchasing program which is ideal for the former may be unsuitable for the latter. This has nothing to do with bugs, file sizes, unreliability and the like. It is solely due to each firm's operations.

Converting to a computerised system requires a delicate compromise. On the one hand, while every opportunity should be taken to optimise the systems used the novice computer manager must resist wholesale changes unless pressing reasons exist why these must be undertaken.

Put another way the businessman still needs to spend his time managing the organisation, not wasting it becoming a hacker. Consequently the system chosen should become part of the working practice with the minimum of disruption. This may well cause elimination from any shortlist of many fine products.

On the other hand the computer system chosen must stay in place for at least three years and preferably for five, unless the nature of the organisation undergoes major changes. Therefore it must not be such a perfect fit that there is no stretch available to accommodate the growth you hope to enjoy during this period.

A couple of years ago I came across a frightening set of figures. Although applying to mainframe computers two of them should still be kept in mind.

Firstly, the total cost of a computer system will be double the cost of the hardware once the cost of programs, training, ancilliary equipment, materials and

→

JO STORK shows how to be your own software reviewer . . . then puts his precepts into practice

From Page 3

so on are included in the final bill.

Secondly, if an organisation relies on a computer system it will ultimately cost the equivalent of 40 per cent of the annual turnover to replace all the data were it to be lost.

It is easy to be misled by the sales patter into thinking that only a couple of hours will be required before enjoying the software's benefits. This may be no more than marketing licence or it may be true. Even assuming that the Trades Descriptions Act is not being shredded many organisations will require far longer due to its being better suited to different commercial procedures.

Remember that assuming you rate your time at only £6 an hour and it takes a very reasonable 20 hours to computerise the manual system you will have invested the equivalent of a disc drive.

On the other hand cheap-skating the preparation, particularly back-up procedures, could cause you to fall foul of the second figure. This is why I now never develop systems which permit an exit before back-ups are taken. Granted losing all the data is the very worst case possible, nevertheless there are few companies that could survive such a total loss and all will be embarrassed by even a partial loss.

Consequently I am not concerned whether some package costs £10 to £15 more than its competitors since the actual program is a relatively trivial part of the total potential outlay.

It may surprise you that the reliability of the system comes lowest in my order of precedence, but the reason is simple. You cannot have failed to read in recent months that a considerable number of systems have been withdrawn from the market until their bugs were fixed. Some of them cost £700. Most of these gremlins were minor and occurred only in unusual circumstances, but even so they demonstrate the pressures facing software houses.

If they delay marketing while more testing is carried out their competitors not only steal a march but the development costs rise with no real guarantee that every bug has been eliminated. There is nothing like a 20,000 user base to take programs into backwaters which the designers never envisaged.

Accepting only 99.9 per cent reliability is in fact no cause for undue concern. Providing one does not try to shoe horn an inappropriate program into an organisation – as this greatly increases the likelihood of visiting previously uncharted waters – there is little risk since the better software houses will not risk their credibility by marketing grossly unreliable software. Furthermore they respond very rapidly to any anomalies one discovers.

The question of reliability is therefore much more a question of an organisation's ability to use the facilities the programmers coded rather than worrying whether this code is correct. This brings us neatly back to the prime question: Is the product right for your needs?

If you apply these principles you will not make any costly mistakes. The following review will serve as an excellent example of their use.

System Delta passes all the tests – and then some

Product: System Delta
Price: £64.95 (inc. VAT)
Supplier: Minerva Systems, 69 Sidwell Street, Exeter, Devon EX4 6PH. Tel: 0392 37756

THE average calculations used in business are within most people's mental arithmetic ability, being little more than simple manipulation of two numbers. While it is certainly true that the majority of organisations have to perform large numbers of such calculations it is equally undeniable that if that was all a computer could carry out most would do better employing a school-leaver with CSE maths and an HB pencil.

Processor speed, Basic instruction set, character set and keyboard layout including function keys and the peripherals available are all vital micro performance criteria, but far more important to the businessman is its file handling. I therefore tend to look at the data storage, retrieval and manipulation of a computer more closely than any other of its performance characteristics. Consequently anything which improves the data handling performance of your computer must be attractive.

The first of my criteria – Is the task right for a micro? – may be completely reversed by the addition of improved filing because this is normally the weakest element in any micro's performance. Money spent on System Delta, which achieves this highly desirable objective, could become one of the most cost effective investments you have ever laid out, by enabling it to handle previously impossible tasks.

System Delta, from Minerva Systems, may be used in one of two ways, since its heart is a 16k ROM giving over 80 extra disc, file and record handling commands.

At its most basic level you may use a file handling package which Minerva calls Card Index. It is to be applauded for a nice line in understatement as most other software houses would be advertising it as an all-singing, all-dancing database offering a full range of data handling facilities.

Many users will find that Card Index is all they will ever require, since it was only when I began to experiment with the most outlandish and exotic record designs my imagination could devise that I occasionally found a limitation. For the average debit-credit-plonk membership or household application this database ranks with the best, providing every facility that is ever likely to be needed.

At its most sophisticated level System Delta can be used by systems developers to produce applications

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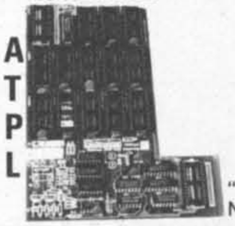

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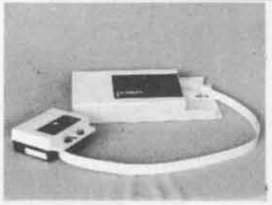

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From Page 4

of a complexity and sophistication which could challenge much more expensive computers. In fact I rate it so highly in this area I hope software houses will be able to come to some licensing arrangement with

SYSTEM
DELTA
APPLICATION
Card Index
MINERVA

Minerva, thereby permitting them to develop exciting new products for those users not willing to create their own systems.

Even the briefest list of facilities indicates the power of the system. One can randomly or relationally access up to 8000 records and up to five files simultaneously at any time. These records can have 250 fields and fields may be up to 200 characters long.

Add to this the powerful sorting, mathematical and conditional possibilities, and you begin to see that even applications such as stock which are anathema to most small micros become respectable possibilities.

Card Index is well within the capability of a BBC Micro and if you have the time or inclination to write your own programs it greatly expands its capabilities. Consequently against the first of my selection criteria I regard System Delta as having passed summa cum lauda.

Regarding my second criteria – the time to get your job up and running – I can not give a simple answer. If all you require is the Card Index then studying the 70 page manual, fitting the ROM and practising with the associated demonstration disc will take three to five hours.

Unfortunately while the basic operation is by menus or cursor movements there are also a fair few Ctrl + key commands to master, which tends to slow down the early hours of application creation. You can put a Help list on the screen if needed, but this greatly reduces the amount of any record that can be displayed.

This is not to imply that the creation time is unreasonable or that the system is not user friendly. It is just to acknowledge that unless you have a photographic memory it takes time to remember all the possibilities available in a very comprehensive system.

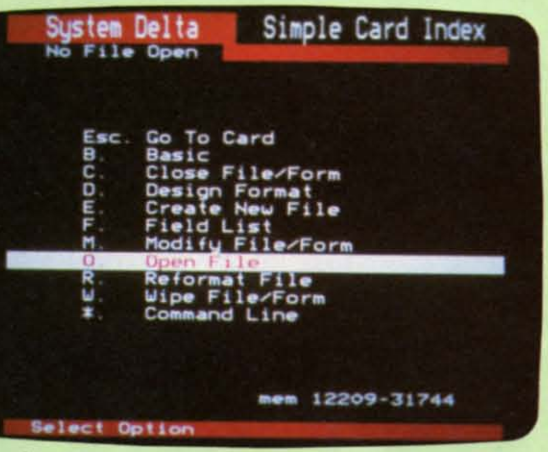
I feel that the final figure will depend on whether you can devote a single lengthy session to learning the system or whether it will be bitty and irregular. Potential users should budget for at least a further five to ten hours in this area. Once the structure is created data handling is exceptionally simple.

This leaves the issue of the time the actual design of the application itself will require. While this may take several further hours, whether using Card Index or developing your own system, I have little doubt that this time will be less than with virtually every other database I know of. This is because one of the biggest problems which micro systems designers face has been removed – that of finding a compromise between:

- The number of data records which may be created.
- Number of fields in each record.
- Length of the fields themselves.
- Degree of arithmetic that may be performed on these fields by the database software itself.
- Sort and search facilities to be used.

All too frequently you have to reduce the size of the record in order to be able to handle more of them. With many databases relying on all the data being held in memory the outcome is impoverished attempts at pouring a quart of information into a pint sized memory.

Since System Delta need hold only a single record in memory at any time this whole compromise disappears, with the result that not only considerable design time can be saved but you can also have the precise data structure you require.



```
System Delta        Simple Card Index
No File Open



      Esc.  Go To Card
      B.    Basic
      C.    Close File/Form
      D.    Design Format
      E.    Create New File
      F.    Field List
      M.    Modify File/Form
      O.    Open File
      R.    Reformat File
      W.    Wipe File/Form
      *.    Command Line



                        mem 12209-31744
Select Option
```

The main menu

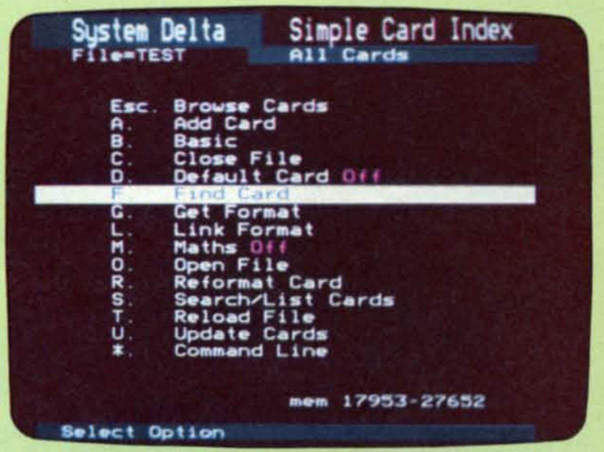
Where memory is not a constraint more records may be retained in memory, resulting in a form of poor man's cache memory. System Delta optimises this for

→

From Page 7

you automatically. In short, the person who finds this package's limits a problem should not be using a BBC Micro.

Adding all the times for the separate stages together I would definitely give System Delta a pass mark. How well it passes depends on the size of the filing task – the bigger the application the higher my rating.



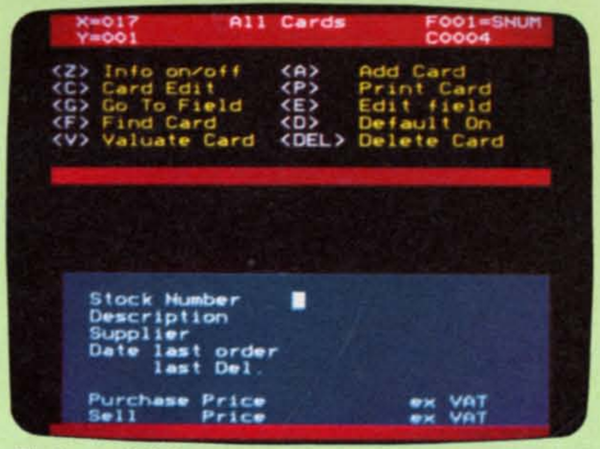
```
System Delta   Simple Card Index
File=TEST      All Cards

     Esc. Browse Cards
     A.   Add Card
     B.   Basic
     C.   Close File
     D.   Default Card Off
     F.   Find Card
     G.   Get Format
     L.   Link Format
     M.   Maths Off
     O.   Open File
     R.   Reformat Card
     S.   Search/List Cards
     T.   Reload File
     U.   Update Cards
     *.   Command Line

                  mem 17953-27652
Select Option
```

The data manipulation menu

The question of how much the system will cost is again dependent upon the use to which it is put. At £64.95 Card Index is very competitively priced. Even a further £19.95 for the Reference Guide, a 160+ page book for the System Designer which describes the extra data handling commands that the ROM allows, does not change this view.



```
X=017          All Cards       F001=SNUM
Y=001                          C0004

<Z> Info on/off    <A>   Add Card
<C> Card Edit      <P>   Print Card
<G> Go To Field    <E>   Edit field
<F> Find Card      <D>   Default On
<V> Valuate Card   <DEL> Delete Card



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   Date last order
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```

The data manipulation screen

The true cost will however be considerably higher. It will depend upon how much you charge for your own time, and yet conversely this is where the greatest savings could occur. Using the full features of System Delta or even just the Card Index to get the application precisely matched to the requirements may take 40 man hours, but the eventual operational savings could be very significant. Once again System Delta gains a pass, although it should be clearly understood that if you have only a minimal application this does become marginal.

On the final point of reliability it passes. Since patching a ROM with a bug is virtually impossible – replacement being the only practical possibility – flaws become even more critical in systems such as this. Consequently part of the reasoning being my testing with extravagant data designs was to visit as many backwaters as possible.

The only funnies I discovered were soon traced to operational errors while familiarising myself with the system. Had I spent more time with the tutorial disc these would not have occurred.

Several points should now be evident. The main one is that having set four stringent criteria against which any software should be judged I must unreservedly recommend a product which so clearly passed them all. Nevertheless there are other issues which make this recommendation even stronger.

The first is the question of speed. This could only be adequately tested by producing a huge file and then manipulating it. Not wishing to squander my life in boring data entry I wrote a tiny program to load 1000 random records into a typical file. The speed with which they could be retrieved or sorted was first class.

The second is the matter of flexibility. This did not form part of my key conditions since even if a piece of software is extremely rigid it might still fit your organisation like a glove.

Naturally I looked at the product very much from the viewpoint of commercial applications, and yet it must be clear by now that since System Delta can be regarded as a major enhancement to the disc handling of a BBC Micro since it is suitable for any disc-based application, whether scientific, commercial, mathematical, sociological or whatever.

Finally a word of caution. It is pure coincidence that the product I used to highlight the consideration when selecting software proved one of the finest I have met.

Looking over the shop shelves and remembering systems I have had the misfortune to encounter suggest you prepare yourself for the sad fact that 50 to 70 per cent will fail on at least one of them. Fortunately the BBC Micro is one of the better endowed machines as far as software is concerned, so this still leaves a large quantity of good, reliable and appropriate software for your organisation.

Jo Stork

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Starting a spreadsheet

By NIGEL PETERS

I HAVE a problem. Last month we had a look at the general principles of spreadsheets and introduced what they can do. Paradoxically we did this by looking at what we'd have to do without a spreadsheet program!

This month we'll be taking a closer look at spreadsheets in operation. And that's where the problem arises. Which one shall I use? There are lots of them about, and to pick out one seems a bit unfair. And then Database, the publishers of this magazine, do their own, as part of Mini Office II. Do I ignore it, and possibly call down the editor's wrath, or use it and draw fire from the producers of other spreadsheets? A difficult decision.

And it's one I fully intend to avoid. What I'll do is compromise. For the next few articles I'll stick rigidly to Mini Office II (on the grounds that it's not only cheap, but also quite good) and then look at some of the alternatives.

However since spreadsheets at their simplest are much of a muchness, most of what I say about Mini Office will apply to other spreadsheets, especially in the early stages. Odd features and keys will change, but the principles are the same.

So without further ado let's have a look at a spreadsheet program in action. I won't go into the details of how to get the program running, even a complete novice should have no difficulty following the instructions (famous last words). The problem is, once you've got it what can you do with it?

An empty spreadsheet is a formidable thing. When you enter the program you'll find yourself faced with a grid looking something like:

```
   .......A.......B.......C
...1
...2
...3
```

It's not hard to see that these are the rows and columns that will be used to hold all the figures that we had on our sheets of paper last time. But how do we get them from the paper to the micro?

The answer lies in the cells formed by the rows and columns of the grid. Unlike our bits of paper, there are no lines separating the rows and columns but if you imagine them on the spreadsheet you should be able to "see" the cells appear. The letters along the top (columns) and the numbers down the side (rows) allow any one cell to be named by a letter and a number. So A1 refers to the cell at the top left of the spreadsheet, A2 to the one below it, B2 to the one next to that and so on.

It's these cells that we're going to fill with figures and formulae. However we can only fill one cell at a time and this cell is known as the active cell. In Mini Office II the active cell is marked by a flashing > cursor. Also above the actual spreadsheet there's a status section telling you which cell is active and what its contents are. This may seem a bit superfluous but you'll see later how useful it is. At the start the status section looks like:

```
Cell=A1
Contents=*EMPTY*
```

This is fair enough. The flashing > cursor is pointing to cell A1 and, as yet, it's blank.

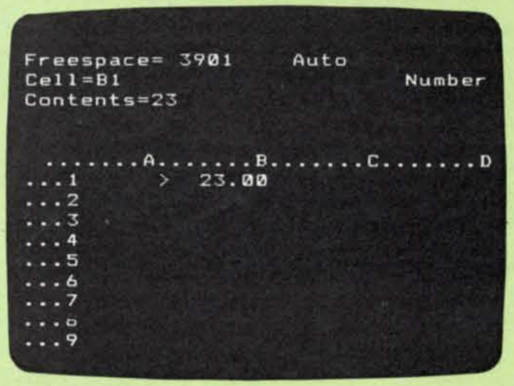
Now we're not stuck to cell A1, we can roam all over the spreadsheet at will. This is done by moving the cursor with the aptly named cursor keys, the ones with the arrows on them. If you press the downwards pointing one, you'll find that the cursor moves to the cell below, A2. This is now the active cell, a situation reflected in the status area which changes to:

```
Cell=A2
Contents=*EMPTY*
```

You can wander over the spreadsheet at will, moving from column to column and row to row, while the status message tries frantically to keep up with you. In doing this you'll find that the original screen is only a small part of the spreadsheet showing the top left corner. As you move the cursor about so the area exposed to view changes. However just because a few cells disappear as you roam don't think they've gone permanently – they're still there and can be seen again by moving the cursor back.

The spreadsheet itself isn't endless. You'll find that there are strict limits beyond which the cursor refuses to go. In Mini Office II the columns go from A to O and

→



```
Freespace= 3901     Auto
Cell=B1                       Number
Contents=23

  .......A.......B.......C.......D
...1       >  23.00
...2
...3
...4
...5
...6
...7
...8
...9
```

Figure I: The spreadsheet after our first entry

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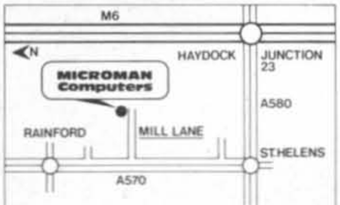

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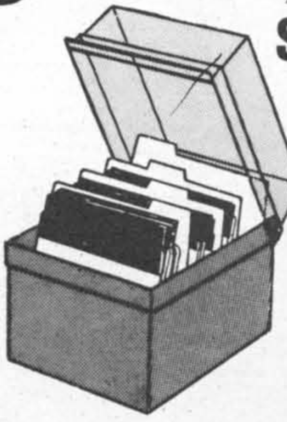

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From Page 10

the rows from 1 to 20. However these aren't fixed and can be changed. For the moment let's stay within these defaults and see what we can do with the cells we have got.

Let's try putting a number into cell B1. We move the cursor to it using the arrowed keys and so make B1 the active cell. The status area reflects this, telling you:

```
Cell=B1
Contents=*EMPTY*
```

Now let's do something about that *EMPTY* by putting a number into the cell. It couldn't be easier. To enter the number 23 into cell B1 you just type in 23 and press Return. The result is that 23 appears on the spreadsheet in cell B1. Well, 23.00 actually, but we'll deal with decimal points later in the series. Figure I shows what's happened.

The status area records this, the message changing to:

```
Cell=B1
Contents=23
```

If you look to the right of the screen you'll see that it tells you what type of contents are in B1 with the rather forlorn message:

```
Number
```

Leaving B1 for the moment, return the cursor to cell A1, making that active. Now we've just seen how to get figures into the spreadsheet. However, as you'll know if you've ever tried doing the accounts, unlabelled columns of numbers can be confusing. Life is a lot easier if they are named. Because of this spreadsheets not only allow numbers to be entered, they allow text as well. So let's label our 23 by putting a bit of text into the cell next to it, A1.

Again it's easy. Suppose the label was NUMBER. All you do is type in the text. The status message changes to:

```
Cell=A1
Contents=
Enter text:
NUMBER
```

as you type. When you press Return, NUMBER appears in the active cell, A1, and the status message goes to:

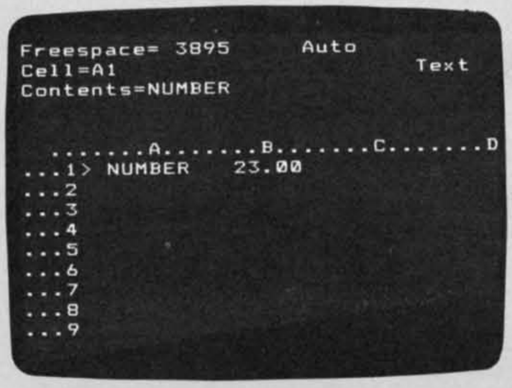
```
Cell=A1
Contents=NUMBER
```

with a solitary:

```
Text
```

out on the right. Figure II shows the results so far.

So we've learnt how to put numbers and text on to a spreadsheet. However if that was all we could do it would be a bit disappointing. Spreadsheets are supposed to do calculations, so how do we get it to do its sums? The answer is, quite easily.



```
Freespace= 3895        Auto
Cell=A1                          Text
Contents=NUMBER


  ........A........B........C........D
...1> NUMBER    23.00
...2
...3
...4
...5
...6
...7
...8
...9
```

Figure II: NUMBER in the active cell A1

Suppose you want to double the number in cell B1 and put the result in cell B2. First you move the cursor to cell B2, making that the active cell. Then all you have to do is tell the program what to do. This is done with the formula B1*2, which means "double the number you find in cell B1". (Remember that the * is the computer's multiply sign, while the backslash, /, is the division sign.)

However, before you can do this you've got to warn the micro that what's coming is a formula. This is done by pressing the red function key marked f0. If this isn't done the program treats the formula as text, with disconcerting results.

Once the f0 has been pressed the message:

```
Enter formula:
B2=
```

appears and you can go ahead, typing in B1*2 and pressing Return. And now the spreadsheet does its sums. The number 46 (23*2) appears in cell B2 and the status area changes to:

```
Cell=B2
Contents=B1*2
```

with a:

```
Formula
```

tag. Notice that the contents of cell B2 are made up of a formula, B1*2 as shown in the status area. On the spreadsheet proper the results of the calculation are shown, in this case, 46. Figure III shows the results so

→

❛The basic idea of entering text, figures and formulae is the underlying theme of working with spreadsheets❜

From Page 13

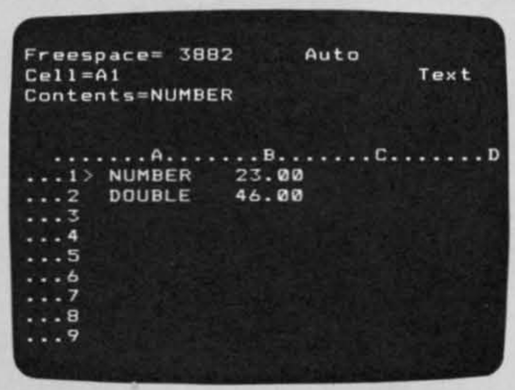
far. You'll see that I've put a label in A2 to remind me of what I've done.

And that is our first spreadsheet. While it may not be the world's greatest, it does show what they can do. Take the cursor back to cell B1, making it active again. Now enter another number, say 20. This replaces the previous number.

That's not all that happens. The number in B2 changes from 46 to 40. It's not surprising really, as we've told the program that B2 is to be twice B1. Still, it's always fascinating watching the way a change in one value ripples through the spreadsheet. Try changing the numbers in B1 and then, as you get more adventurous, have a go at putting different formulae in B2 and see what happens. Also, don't stay stuck in the top left corner. Spread out into the other cells.

> **‘It's fascinating the way a change in one value ripples through the spreadsheet’**

And that, in essence, is all there is to a spreadsheet. However there's a lot more to them as we'll see in the next few months. But the basic idea of entering text, figures and formulae is the underlying theme of working with spreadsheets. Different programs will have different numbers of cells and ways of entering and manipulating data, but the principles are the same. More on them next time.



```
Freespace= 3882       Auto
Cell=A1                         Text
Contents=NUMBER


   .......A.......B.......C.......D
...1> NUMBER    23.00
...2  DOUBLE    46.00
...3
...4
...5
...6
...7
...8
...9
```

Figure III: The results of the calculation

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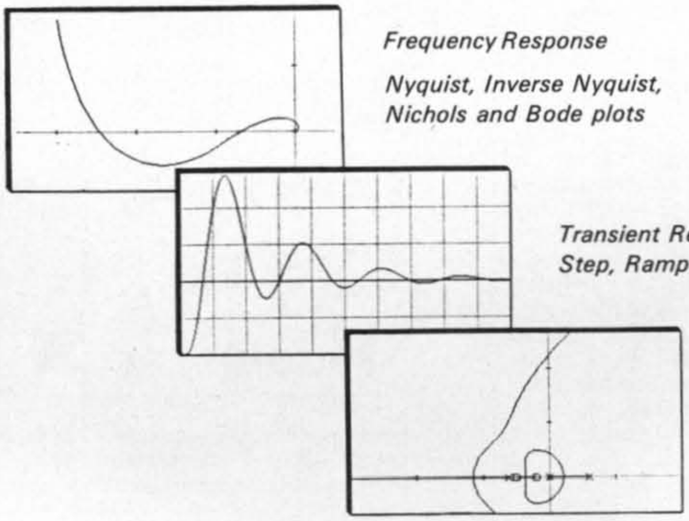

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Vertical market solutions needn't cost the earth

By JOHN LETTICE

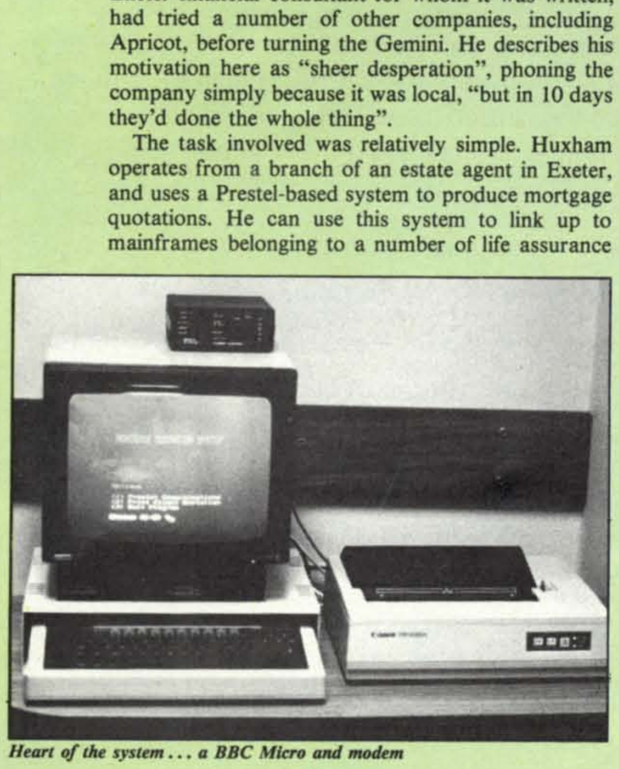
THE computer industry rightly salivates at the thought of vertical markets. Manufacturers of software, hardware and peripherals see the need potential customers have for complete software and hardware solutions, tailored for their own businesses, and all too often also see the opportunity for a heavy mark-up on the "solution" sold. Well it is tailor made, after all . . .

But it needn't always be that way, as companies, influenced by the relative cheapness of the BBC Micro – and latterly the Amstrad machines – have started to recognise that users need cheap, simple solutions to their own specific problems. Gemini Marketing is one such company.

Gemini has so far set up a simple but effective mortgage quotation service for a local financial consultant, and is liaising with a petrol station manager, a regular Gemini customer, to produce a petrol station management system. Jeremy Rihll, a director of Gemini, stresses the virtues of this local contact, and points to how the company is extending the system with its hotelkeeper's system, currently under development. The latter is based on the Master series, and because Gemini is based in Exmouth, in the heart of the tourist trade, he feels his company will be well placed to research and develop the product, and to service a compact local customer base.

The mortgage system has been in place since November, and is something of a feather in the company's cap, not least because Adrian Huxham, the Exeter financial consultant for whom it was written, had tried a number of other companies, including Apricot, before turning the Gemini. He describes his motivation here as "sheer desperation", phoning the company simply because it was local, "but in 10 days they'd done the whole thing".

The task involved was relatively simple. Huxham operates from a branch of an estate agent in Exeter, and uses a Prestel-based system to produce mortgage quotations. He can use this system to link up to mainframes belonging to a number of life assurance companies, punch in the sum required and get the quotation on screen. What he wanted was a system that would take the details from the screen, giving size of mortgage, type, monthly repayment and so on, and patch them into a printout. Before the system was installed these figures would be patched into a separate WP system used by a secretary elsewhere in the building.



Heart of the system . . . a BBC Micro and modem

Gemini's solution consists of a BBC B, monitor, Canon dot matrix printer, Miracle WS3000 modem and, of course, the software. From the user's point of view it's just a matter of switching the computer on and running the software. It then dials up Prestel and logs on. Passwords and identification numbers are built into the software.

The life assurance companies Adrian Huxham deals with have varying screen formats, but the software is designed to recognise these and then, when the selection is made, allows Huxham to print out a personalised letter to the customer giving a text explanation and a tabular comparison of rates. The only keyboard work involved in the process is entering the size of the mortgage and following the menus.

Huxham reckons the new system saves him between a quarter and a third of the time taken previously, but that isn't really the point, as he can cut out the secretarial process, thus giving himself a greater measure of independence and cutting out the need for checking documents after they're produced. He also feels that actually having the beast cranking out the quotation before the client's eyes is a valuable sales aid. The Canon printer is no daisywheel, but he feels the near letter quality mode is fine for his purposes, and the cheapness of the whole system means it can be used to

→

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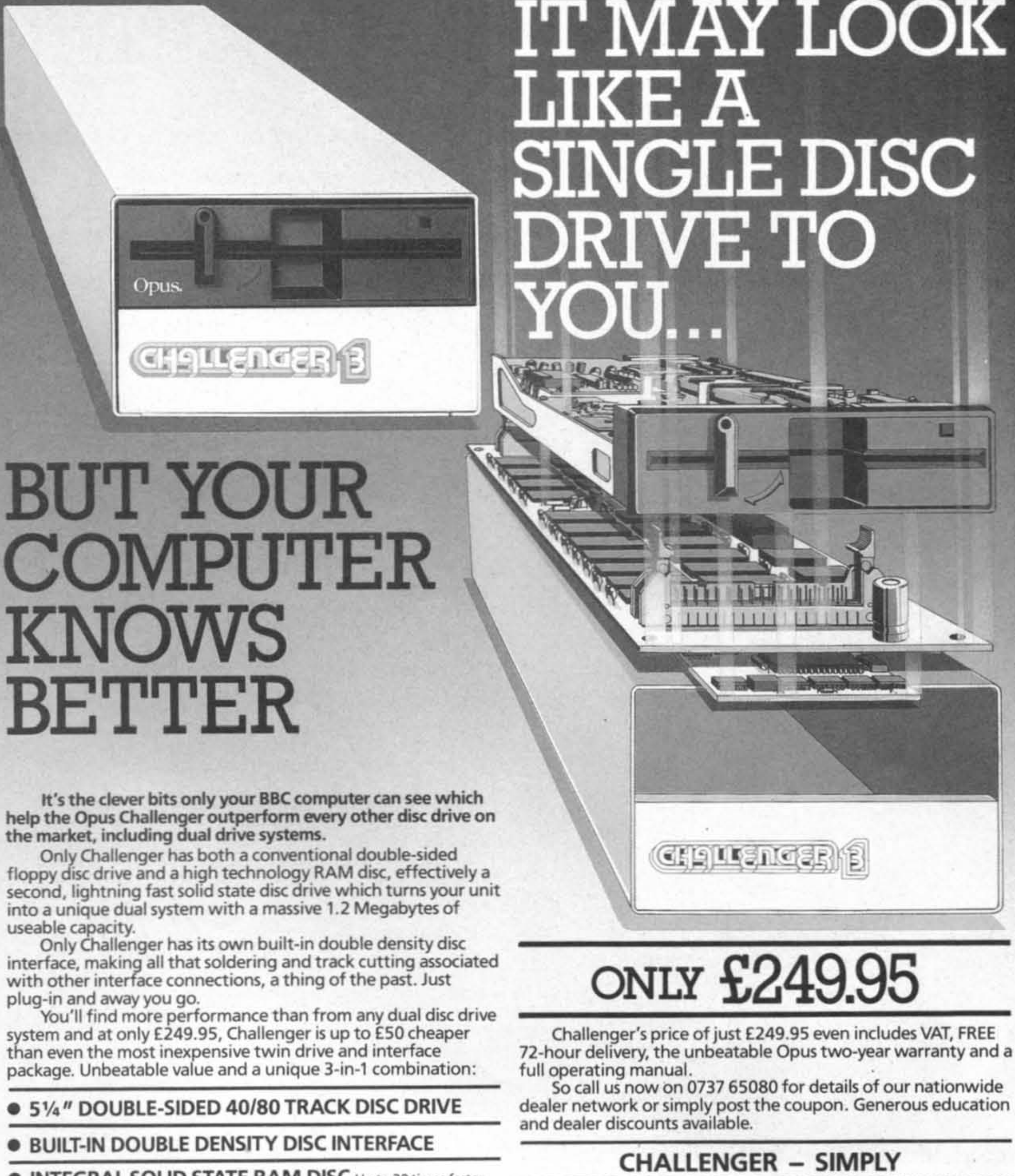

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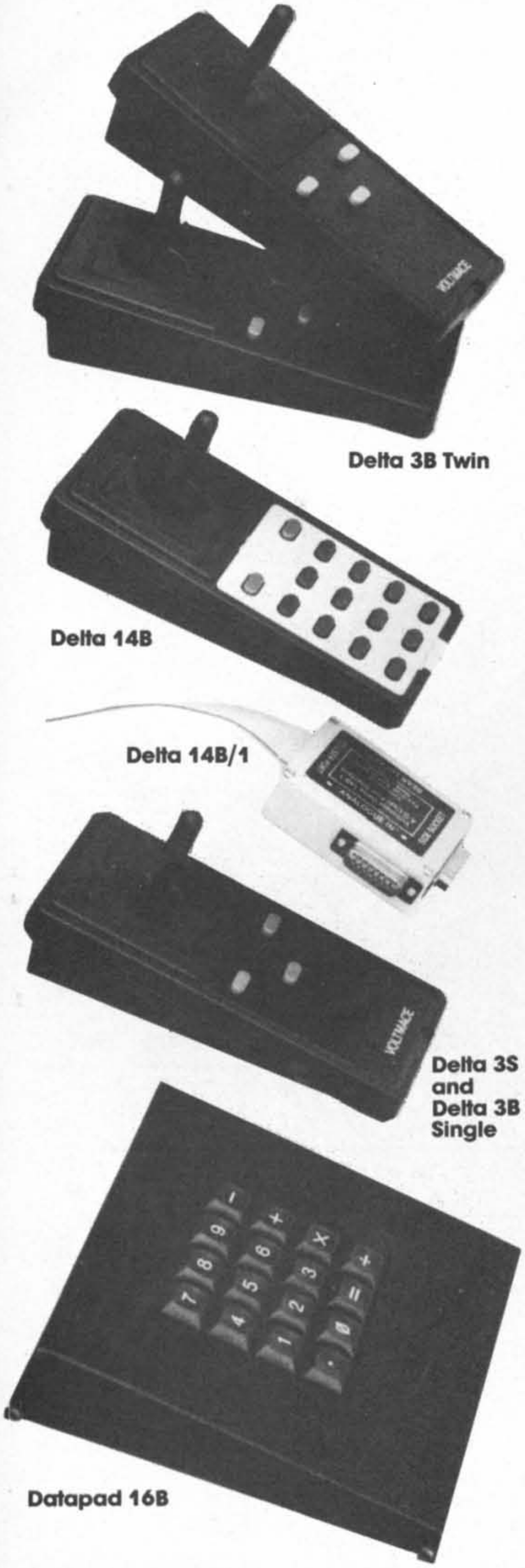
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DELTA 3B TWIN—BBC B or ELECTRON PLUS 1 **£19.95**
A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

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The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
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DELTA 3S—ELECTRON with switch joystick interface £12.00
For an ELECTRON with a switched joystick interface (Not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

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This little box plugs in series with your analogue joystick to alter its characteristics simply by using a switch. In one set up the joystick will act like a switched joystick, i.e. a slight movement will act as if the joystick has been pushed hard over. In the other mode the joystick only covers the centre half of the A/D converter so that it takes twice as much movement to give the same effect. This makes it much easier to make delicate adjustments to programs like flight simulators.

DATAPAD 16B **£39.95**
A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

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From Page 16

equip some of the other 10 offices in the estate agent's chain.

The system has only failed twice since it was installed, and Huxham freely admits these were both user error. Once a cable was plugged in wrongly after the machine had been moved, and the other time the modem had been accidentally switched off line. It is however something of a tribute to the software writer's art to have a system so easy to use that mistakes this elementary become "problems".

"I'm delighted with the system", says Huxham. "I've not seen anything like it, even in large London finance houses".

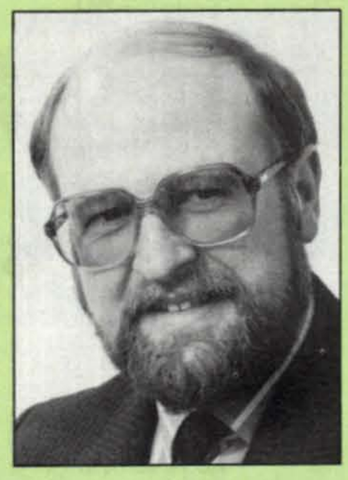
John Lily is another, but more long-standing, customer of Gemini's managing a filling station just down the road from the company's HQ. He's a self-confessed computer nut, and while collecting a substantial quantity of software he doesn't use he's also run his filling station with a combination of BeebCalc and Gemini's LBO (Life and Business Organiser) diary program for some time now.

He has strong views on software, and is ideally placed to beard Gemini on the subject. He'd also considered an Apricot-based system to manage his station but baulked at the price, and instead began talking to Gemini about the kind of software he felt he wanted.

The project this generated currently involves Lily, Gemini and psychology and programming expertise from local academics (psychology from the "ease of use" point of view). Lily's input, says Jeremy Rihll, is useful because of his knowledge of the business, particularly as he points out things the program should include even if they're not relevant to his own high volume station.

Filling stations themselves are peculiar beasts from the management, and therefore the software, point of view. They are basically small shops selling sweets, cigarettes and the like, and therefore need to be administered like small shops, but one of their lines, their main raison d'etre, is petrol. This particular line dominates turnover, and with a single delivery costing five figures, the money involved leaps around like crazy, and any software has to take account both of the Mars bar and the tanker delivery ends of the market.

> **‘There's a big market out there for a sub-£1,000 management system’**



Adrian Huxham is delighted with the system . . . "I've not seen anything like it, even in large London finance houses".

Rihll is confident that the problems can be solved, however, and that there's a big market out there for a sub-£1,000 management system. Sadly, the system is going out on the Amstrad (heresy!) but that's show business . . .

But with the hotel system Gemini is keeping the faith, this time in the shape of the Master series. The system is now up and running, and is going through testing prior to release. Again it's completely menu-driven, but this time is separated into four sections – room descriptions (up to 60), bookings (for a complete year if necessary), printing and maintenance.

The spacebar takes you through the main options, with Return taking you into the one selected, and then you're in a section with a series of management options. The booking section, for example, is presented as a scrolling calendar with room occupation kept track of by A for arrival date, O for occupied and D for departure. You can also define room characteristics and billing items, and print out chits for arrival, acceptances of bookings, bills and so on.

Rihll is confident that it'll go down well in the Devon and Cornwall area, and it's likely its price will compare favourably with the products of more traditional business software companies.

The thing these three products have in common is that they provide specific solutions to specific problems. The solutions are complete, in that they consist of both hardware and software, and although they're not as powerful as the flashier database or integrated business software products they will in the right place, be more effective products. Vertical solutions are of course available further up the scale, but they're expensive, often difficult to use, and – as Adrian Huxam found – can be difficult to find. In that sense Gemini could find itself filling a valuable niche in the market.

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